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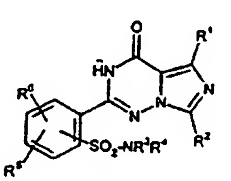
(54) Title: 2-PHENYL SUBSTITUTED IMIDAZOTRIAZINONES AS PHOSPHODIESTERASE INHIBITORS

(54) Bezeichnung: 2-PHENYL-SUBSTITUIERTE IMIDAZOTRIAZINONE ALS PHOSPHODIESTERASE INHIBITOREN



(I)

(57) Abstract

The invention relates to 2-phenyl substituted imidazotriazinones with short, unbranched alkyl radicals in position 9 in accordance with general formula (I). Said 2-phenyl substituted imidazotriazinones are produced from the corresponding 2-phenyl imidazotriazinones by chlorosulphonation and subsequent reaction with the amines. These compounds inhibit cGMP-metabolising phosphodiesterases and are suitable for use as the active agents in medicaments for treating cardiovascular and cerebrovascular diseases and/or diseases of the urogenital system, especially for treating erectile dysfunction.

(57) Zusammenfassung

Die 2-Phenyl-substituierten Imidazotriazinone mit kurzen, unverzweigten Alkylresten in der 9-Position gemäß der allgemeinen Formel (I) werden aus den entsprechenden 2-Phenyl-imidazotriazinonen durch Chlorsulfonierung und anschließender Umsetzung mit den Aminen hergestellt. Die Verbindungen hemmen cGMP-metabolisierende Phosphodiesterasen und eignen sich als Wirkstoffe in Arzneimitteln, zur Behandlung von cardiovaskulären und cerebrovaskulären Erkrankungen und/oder Erkrankungen des Urogenitalsystems, insbesondere zur Behandlung der erektilen Dysfunktion.

2-PHENYL-SUBSTITUTED IMIDAZOTRIAZINONES AS PHOSPHODIESTERASE INHIBITORS

The present invention relates to 2-phenyl-substituted imidazotriazinones, to processes for their preparation and to their use as pharmaceuticals, in particular as inhibitors of cGMP-metabolizing phosphodiesterases.

The published specification DE 28 11 780 describes imidazotriazines as bronchodilators having spasmolytic activity and inhibitory activity against phosphodiesterases which metabolize cyclic adenosin monophosphate (cAMP-PDEs, nomenclature according to Beavo: PDE-III and PDE-IV). An inhibitory action against phosphodiesterases which metabolize cyclic guanosin monophosphate (cGMP-PDEs, nomenclature according to Beavo and Reifsnyder (Trends in Pharmacol. Sci. 11, 150-155, 1990) PDE-I, PDE-II and PDE-V) has not been described. Compounds having a sulphonamide group in the aryl radical in the 2-position are not claimed. Furthermore, FR 22 13 058, CH 59 46 71, DE 22 55 172, DE 23 64 076 and EP 000 9384 describe imidazotriazinones which do not have a substituted aryl radical in the 2-position and are likewise said to be bronchodilators having cAMP-PDE inhibitory action.

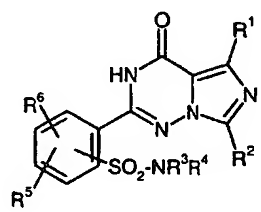
WO 94/28902 describes pyrazolopyrimidinones which are suitable for treating impotence.

The compounds according to the invention are potent inhibitors either of one or of more of the phosphodiesterases which metabolize cyclic guanosin 3′,5′-monophosphate (cGMP-PDEs). According to the nomenclature of Beavo and Reifsnyder (Trends in Pharmacol. Sci. 11, 150-155, 1990) these are the phosphodiesterase isoenzymes PDE-I, PDE-II and PDE-V.

An increase of the cGMP concentration can lead to beneficial antiaggregatory, antithrombotic, antiprolific, antivasospastic, vasodilative, natriuretic and diuretic

effects. It can influence the short- or long-term modulation of vascular and cardiac inotropy, of the pulse and of cardiac conduction (J.C. Stoclet, T. Keravis, N. Komas and C. Kugnier, Exp. Opin. Invest. Drugs (1995), 4 (11), 1081-1100).

The present invention, accordingly, provides 2-phenyl-substituted imidazotriazinones of the general formula (I)



(I)

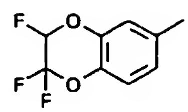
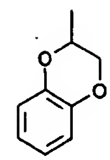
in which

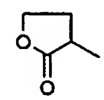
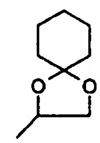
R^1 represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

R^2 represents straight-chain alkyl having up to 4 carbon atoms,

R^3 and R^4 are identical or different and each represents hydrogen or represents straight-chain or branched alkenyl or alkoxy having in each case up to 8 carbon atoms, or

represents a straight-chain or branched alkyl chain having up to 10 carbon atoms which is optionally interrupted by an oxygen atom and which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of trifluoromethyl, trifluoromethoxy, hydroxyl, halogen, carboxyl, benzyloxycarbonyl, straight-chain or branched alkoxycarbonyl having up to 6 carbon atoms and/or by radicals of the formulae $-SO_3H$, $-(A)_a-NR^7R^8$, $-O-CO-NR^{7'}R^{8'}$, $-S(O)_b-R^9$, $-P(O)(OR^{10})(OR^{11})$,

, ,

 and/or 

in which

a and b are identical or different and each represents a number 0 or 1,

A represents a radical CO or SO_2,

R^7, $R^{7'}$, R^8 and $R^{8'}$ are identical or different and each represents hydrogen, or

represents cycloalkyl having 3 to 8 carbon atoms, aryl having 6 to 10 carbon atoms, a 5- to 6-membered unsaturated, partially unsaturated or saturated, optionally benzo-fused heterocycle having up to 3 heteroatoms from the group consisting of S, N and O, where the abovementioned ring systems are optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, nitro, trifluoromethyl, trifluoromethoxy, carboxyl, halogen, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms or by a group of the formula $-(SO_2)_c-NR^{12}R^{13}$,

in which

c represents a number 0 or 1,

R^{12} and R^{13} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 5 carbon atoms,

or

R^7, $R^{7'}$, R^8 and $R^{8'}$ each represent straight-chain or branched alkoxy having up to 6 carbon atoms, or
represents straight-chain or branched alkyl having up to 8 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, halogen, aryl having 6 to 10 carbon atoms, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms or by a group of the formula $-(CO)_d-NR^{14}R^{15}$,

in which

R^{14} and R^{15} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

and

d represents a number 0 or 1,

or

R^7 and R^8 and/or $R^{7'}$ and $R^{8'}$ together with the nitrogen atom form a 5- to 7-membered saturated heterocycle which may optionally contain a

further heteroatom from the group consisting of S and O or a radical of the formula $-NR^{16}$,

in which

R^{16} represents hydrogen, aryl having 6 to 10 carbon atoms, benzyl, a 5- to 7-membered aromatic or saturated heterocycle having up to 3 heteroatoms from the group consisting of S, N and O which is optionally substituted by methyl, or
represents straight-chain or branched alkyl having up to 6 carbon atoms which is optionally substituted by hydroxyl,

R^9 represents aryl having 6 to 10 carbon atoms, or
represents straight-chain or branched alkyl having up to 4 carbon atoms,

R^{10} and R^{11} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

and/or the alkyl chain listed above under R^3/R^4 is optionally substituted by cycloalkyl having 3 to 8 carbon atoms, aryl having 6 to 10 carbon atoms or by a 5- to 7-membered partially unsaturated, saturated or unsaturated, optionally benzo-fused heterocycle which may contain up to 4 heteroatoms from the group consisting of S, N and O or a radical of the formula $-NR^{17}$,

in which

R^{17} represents hydrogen, hydroxyl, formyl, trifluoromethyl, straight-chain or branched acyl or alkoxy having in each case up to 4 carbon atoms,

or represents straight-chain or branched alkyl having up to 6 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl and straight-chain or branched alkoxy having up to 6 carbon atoms,

and where aryl and the heterocycle are optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of nitro, halogen, $-SO_3H$, straight-chain or branched alkyl or alkoxy having in each case up to 6 carbon atoms, hydroxyl, trifluoromethyl, trifluoromethoxy and/or by a radical of the formula $-SO_2-NR^{18}R^{19}$,

in which

R^{18} and R^{19} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 6 carbon atoms,

and/or

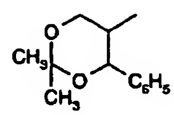
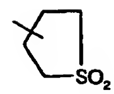
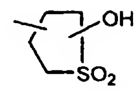
R^3 or R^4 represents a group of the formula $-NR^{20}R^{21}$,

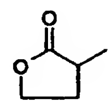
in which

R^{20} and R^{21} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

and/or

R^3 or R^4 represents adamantyl, or represents radicals of the formulae

, , 

or .

or represents cycloalkyl having 3 to 8 carbon atoms, aryl having 6 to 10 carbon atoms or represents a 5- to 7-membered partially unsaturated, saturated or unsaturated, optionally benzo-fused heterocycle which may contain up to 4 heteroatoms from the group consisting of S, N and O, or a radical of the formula $-NR^{22}$,

in which

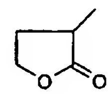
R^{22} has the meaning of R^{16} given above and is identical to or different from it, or
represents carboxyl, formyl or straight-chain or branched acyl having up to 5 carbon atoms,

and where cycloalkyl, aryl and/or the heterocycle are optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of halogen, triazolyl, trifluoromethyl, trifluoromethoxy, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 6 carbon atoms, nitro and/or by groups of the formulae $-SO_3H$, $-OR^{23}$, $(SO_2)_cNR^{24}R^{25}$, $-P(O)(OR^{26})(OR^{27})$,

in which

e represents a number 0 or 1,

R^{23} represents a radical of the formula



, or

represents cycloalkyl having 3 to 7 carbon atoms, or
represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms which is optionally substituted by cycloalkyl having 3 to 7 carbon atoms, benzyloxy, tetrahydropyranyl, tetrahydrofuranyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms, carboxyl, benzyloxycarbonyl or phenyl which for its part may be mono- or polysubstituted by identical or different substituents selected from the group consisting of straight-chain or branched alkoxy having up to 4 carbon atoms, hydroxyl and halogen,

and/or alkyl which is optionally substituted by radicals of the formulae $-CO-NR^{28}R^{29}$ or $-CO-R^{30}$,

in which

R^{28} and R^{29} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 8 carbon atoms, or

R^{28} and R^{29} together with the nitrogen atom form a 5- to 7-membered saturated heterocycle which may optionally contain a further heteroatom from the group consisting of S and O,

and

R^{30} represents phenyl or adamantyl,

R^{24} and R^{25} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

R^{26} and R^{27} have the meanings of R^{10} and R^{11} given above and are identical to or different from them

and/or cycloalkyl, aryl and/or the heterocycle are optionally substituted by straight-chain or branched alkyl having up to 6 carbon atoms which is optionally substituted by hydroxyl, carboxyl, by a 5- to 7-membered heterocycle having up to 3 heteroatoms from the group consisting of S, N and O, or by groups of the formula $-SO_2-R^{31}$, $P(O)(OR^{32})(OR^{33})$ or $-NR^{34}R^{35}$,

in which

R^{31} represents hydrogen or has the meaning of R^9 given above and is identical to or different from it,

R^{32} and R^{33} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{34} and R^{35} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 6 carbon atoms which is optionally substituted by hydroxyl or by straight-chain or branched alkoxy having up to 4 carbon atoms, or

R^{34} and R^{35} together with the nitrogen atom form a 5- to 6-membered saturated heterocycle which may contain a further heteroatom from the group consisting of S and O, or a radical of the formula $-NR^{36}$,

in which

R^{36} represents hydrogen, hydroxyl, straight-chain or branched alkoxycarbonyl having up to 7 carbon atoms or straight-chain or branched alkyl having up to 5 carbon atoms which is optionally substituted by hydroxyl,

or

R^3 and R^4 together with the nitrogen atom form a 5- to 7-membered unsaturated or saturated or partially unsaturated, optionally benzo-fused heterocycle which may optionally contain up to 3 heteroatoms from the group consisting of S, N and O, or a radical of the formula $-NR^{37}$,

in which

R^{37} represents hydrogen, hydroxyl, formyl, trifluoromethyl, straight-chain or branched acyl, alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms,
or represents straight-chain or branched alkyl having up to 6 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, trifluoromethyl, carboxyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms, or by groups of the formula

$-(D)_f-NR^{38}R^{39}$, $-CO-(CH_2)_g-O-CO-R^{40}$, $-CO-(CH_2)_h-OR^{41}$ or $-P(O)(OR^{42})(OR^{43})$,

in which

g and h are identical or different and each represents a number 1, 2, 3 or 4,

and

f represents a number 0 or 1,

D represents a group of the formula -CO or $-SO_2$,

R^{38} and R^{39} are identical or different and each has the meaning of R^7 and R^8 given above,

R^{40} represents straight-chain or branched alkyl having up to 6 carbon atoms,

R^{41} represents straight-chain or branched alkyl having up to 6 carbon atoms,

R^{42} and R^{43} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

or

R^{37} represents a radical of the formula $-(CO)_i-E$,

in which

i represents a number 0 or 1,

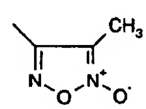
E represents cycloalkyl having 3 to 7 carbon atoms or benzyl, represents aryl having 6 to 10 carbon atoms or a 5- to 6-membered aromatic heterocycle having up to 4 heteroatoms from the group consisting of S, N and O, where the abovementioned ring systems are optionally mono- or polysubstituted by identical or different constituents selected from the group consisting of nitro, halogen, $-SO_3H$, straight-chain or branched alkoxy having up to 6 carbon atoms, hydroxyl, trifluoromethyl, trifluoromethoxy, or by a radical of the formula $-SO_2-NR^{44}R^{45}$,

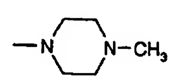
in which

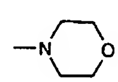
R^{44} and R^{45} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

or

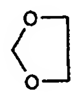
E represents radicals of the formulae

 ,



or  .

and the heterocycle listed under R^3 and R^4, which is formed together with the nitrogen atom, is optionally mono- or polysubstituted, if appropriate also geminally, by identical or different substituents selected from the group consisting of hydroxyl, formyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 6 carbon atoms, nitro and groups of the formulae -P(O)(OR^{46})(OR^{47}),

 , $=NR^{48}$ or $—(CO)_jNR^{49}R^{50}$

in which

R^{46} and R^{47} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{48} represents hydroxyl or straight-chain or branched alkoxy having up to 4 carbon atoms,

j represents a number 0 or 1,

and

R^{49} and R^{50} are identical or different and have the meanings of R^{14} and R^{15} given above,

and/or the heterocycle listed under R^3 and R^4, which is formed together with the nitrogen atom, is optionally substituted by straight-chain or branched alkyl having up to 6 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, halogen,

carboxyl, cycloalkyl or cycloalkyloxy having in each case 3 to 8 carbon atoms, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms, or by a radical of the formula $-SO_3H$, $-NR^{51}R^{52}$ or $P(O)OR^{53}OR^{54}$,

in which

R^{51} and R^{52} are identical or different and each represents hydrogen, phenyl, carboxyl, benzyl or straight-chain or branched alkyl or alkoxy having in each case up to 6 carbon atoms,

R^{53} and R^{54} are identical or different and have the meanings of R^{10} and R^{11} given above,

and/or the alkyl is optionally substituted by aryl having 6 to 10 carbon atoms which for its part may be mono- or polysubstituted by identical or different substituents selected from the group consisting of halogen, hydroxyl, straight-chain or branched alkoxy having up to 6 carbon atoms, or by a group of the formula $-NR^{51'}R^{52'}$,

in which

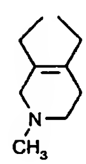
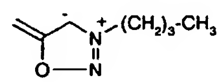
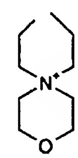
$R^{51'}$ and $R^{52'}$ have the meanings of R^{51} and R^{52} given above and are identical to or different from them,

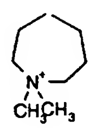
and/or the heterocycle listed under R^3 and R^4, which is formed together with the nitrogen atom, is optionally substituted by aryl having 6 to 10 carbon atoms or by a 5- to 7-membered saturated, partially unsaturated or unsaturated heterocycle having up to 3 heteroatoms from the group consisting of S, N and O, optionally also attached via a nitrogen function, where the ring systems for their part

may be substituted by hydroxyl or by straight-chain or branched alkyl or alkoxy having in each case up to 6 carbon atoms,

or

R^3 and R^4 together with the nitrogen atom form radicals of the formulae

 ,  , 

or  .

R^5 and R^6 are identical or different and each represents hydrogen, straight-chain or branched alkyl having up to 6 carbon atoms, hydroxyl or represents straight-chain or branched alkoxy having up to 6 carbon atoms,

and their salts, hydrates, N-oxides and isomeric forms.

The compounds according to the invention may exist in stereoisomeric forms which are related either as image and mirror image (enantiomers), or which are not related as image and mirror image (diastereomers). The invention relates both to the enantiomers or diastereomers and to their respective mixtures. The racemic forms can, just like the

diastereomers, be separated in a known manner into the stereoisomerically pure constituents.

The substances according to the invention may also be present as salts. In the context of the invention, preference is given to physiologically acceptable salts.

Physiologically acceptable salts can be salts of the compounds according to the invention with inorganic or organic acids. Preference is given to salts with inorganic acids, such as, for example, hydrochloric acid, hydrobromic acid, phosphoric acid or sulphuric acid, or to salts with organic carboxylic or sulphonic acids, such as, for example, acetic acid, maleic acid, fumaric acid, malic acid, citric acid, tartaric acid, lactic acid, benzoic acid, or methanesulphonic acid, ethanesulphonic acid, phenylsulphonic acid, toluenesulphonic acid or naphthalenedisulphonic acid.

Physiologically acceptable salts can also be metal or ammonium salts of the compounds according to the invention. Particular preference is given to, for example, sodium, potassium, magnesium or calcium salts, and also to ammonium salts which are derived from ammonia or organic amines, such as, for example, ethylamine, di- or triethylamine, di- or triethanolamine, dicyclohexylamine, dimethylaminoethanol, arginine, lysine, ethylenediamine or 2-phenylethylamine.

In the context of the invention, an optionally benzo-fused heterocycle generally represents a saturated, partially unsaturated or unsaturated 5- to 7-membered heterocycle which may contain up to 4 heteroatoms from the group consisting of S, N and O. Examples which may be mentioned are: azepine, diazepine, indolyl, isoquinolyl, quinolyl, benzo[b]thiophene, benzo[b]furanyl, pyridyl, thienyl, tetrahydrofuranyl, tetrahydropyranyl, furyl, pyrrolyl, thiazolyl, triazolyl, tetrazolyl, isoxazolyl, imidazolyl, morpholinyl, thiomorpholinyl, pyrrolidinyl, piperazinyl, N-methylpiperazinyl or piperidinyl. Preference is given to quinolyl, furyl, pyridyl, thienyl, piperidinyl, pyrrolidinyl, piperazinyl, azepine, diazepine, thiazolyl, triazolyl, tetrazolyl, tetrahydrofuranyl, tetrahydropyranyl, morpholinyl and thiomorpholinyl.

In the context of the invention, a straight-chain or branched acyl radical having 1 to 6 carbon atoms represents, for example acetyl, ethylcarbonyl, propylcarbonyl, isopropylcarbonyl, butylcarbonyl, isobutylcarbonyl, pentylcarbonyl and hexylcarbonyl. Preference is given to a straight-chain or branched acyl radical having 1 to 4 carbon atoms. Particular preference is given to acetyl and ethylcarbonyl.

In the context of the invention, a straight-chain or branched alkoxy radical having 1 to 6 or 1 to 4 carbon atoms represents methoxy, ethoxy, n-propoxy, isopropoxy, tert-butoxy, n-pentoxy and n-hexoxy. Preference is given to a straight-chain or branched alkoxy radical having 1 to 6, 1 to 4 or 1 to 3 carbon atoms. Particular preference is given to a straight-chain or branched alkoxy radical having 1 to 3 carbon atoms.

In the context of the invention, a straight-chain or branched alkoxycarbonyl radical having 1 to 6 carbon atoms represents, for example, methoxycarbonyl, ethoxycarbonyl, n-propoxycarbonyl, isopropoxycarbonyl and tert-butoxycarbonyl. Preference is given to a straight-chain or branched alkoxycarbonyl radical having 1 to 4 carbon atoms. Particular preference is given to a straight-chain or branched alkoxycarbonyl radical having 1 to 3 carbon atoms.

In the context of the invention, a straight-chain or branched alkyl radical having 1 to 4, 1 to 6, 1 to 8 and 1 - 10 carbon atoms represents, for example, methyl, ethyl, n-propyl, isopropyl, tert-butyl, n-pentyl, n-hexyl, n-heptyl, n-octyl, n-nonyl and n-decyl. Preference is given to straight-chain or branched alkyl radicals having 1 to 3, 1 to 4 or 1 to 8 carbon atoms. Particular preference is given to straight-chain or branched alkyl radicals having 1 to 4 or 1 to 3 carbon atoms.

In the context of the invention, straight-chain alkyl having up to 4 carbon atoms represents, for example, methyl, ethyl, n-propyl and n-butyl.

<u>(C_6-C_{10})-Aryl</u> generally represents an aromatic radical having 6 to 10 carbon atoms. Preferred aryl radicals are phenyl and naphthyl.

In the context of the invention, <u>cycloalkyl having 3 to 8 or 3 to 7 carbon atoms</u> represents, for example, cyclopropyl, cyclopentyl, cyclobutyl, cyclohexyl, cycloheptyl or cyclooctyl. Preference is given to: cyclopropyl, cyclopentyl and cyclohexyl.

In the context of the invention, <u>cycloalkyloxy having 3 to 8 carbon atoms</u> represents cyclopropyloxy, cyclopentyloxy, cyclobutyloxy, cyclohexyloxy, cycloheptyloxy or cyclooctyloxy. Preference is given to: cyclopropyloxy, cyclopentyloxy and cyclohexyloxy.

In the context of the invention, <u>halogen</u> generally represents fluorine, chlorine, bromine and iodine. Preference is given to fluorine, chlorine and bromine. Particular preference is given to fluorine and chlorine.

In the context of the invention and depending on the abovementioned substituents, <u>a 5- to 6-membered or 7-membered saturated heterocycle,</u> which may contain a further heteroatom from the group consisting of S, N and O represents, for example, morpholinyl, piperidinyl, piperazinyl, tetrahydropyranyl or tetrahydrofuranyl. Preference is given to morpholinyl, tetrahydropyranyl, piperidinyl and piperazinyl.

In the context of the invention, <u>a 5- to 6-membered aromatic heterocycle</u> having up to 3 or 4 heteroatoms from the group consisting of S, O and N represents, for example, pyridyl, pyrimidyl, pyridazinyl, thienyl, furyl, pyrrolyl, thiazolyl, oxazolyl or imidazolyl. Preference is given to pyridyl, pyrimidyl, pyridazinyl, furyl and thiazolyl.

In the context of the invention, <u>a 5- to 6-membered unsaturated, partially unsaturated and saturated heterocycle</u> which may contain up to 3 or 4 heteroatoms from the group consisting of S, O and N represents, for example, pyridyl, pyrimidyl, pyridazinyl, thienyl, furyl, pyrrolyl, thiazolyl, oxazolyl, imidazolyl, piperidinyl, piperazinyl or

morpholinyl. Preference is given to pyridyl, pyrimidyl, piperazinyl, pyridazinyl, morpholinyl, furyl and thiazolyl.

The compounds according to the invention, in particular the salts, may also be present as hydrates. In the context of the invention, hydrates are those compounds which contain water in the crystal. Such compounds may contain one or more, typically 1 to 5, equivalents of water. Hydrates can be prepared, for example, by crystallizing the compound in question from water or from a water-containing solvent.

Preference is given to compounds of the general formula (I) according to the invention

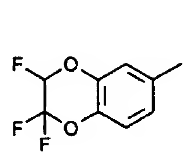
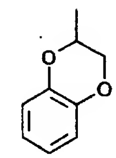
in which

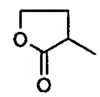
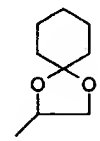
R^1 represents straight-chain or branched alkyl having up to 3 carbon atoms,

R^2 represents straight-chain alkyl having up to 3 carbon atoms,

R^3 and R^4 are identical or different and each represents hydrogen or represents straight-chain or branched alkenyl or alkoxy having in each case up to 6 carbon atoms, or

represents a straight-chain or branched alkyl chain having up to 8 carbon atoms which is optionally interrupted by an oxygen atom and which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, carboxyl, benzyloxycarbonyl, straight-chain or branched alkoxycarbonyl having up to 5 carbon atoms, and/or by radicals of the formulae $-SO_3H$, $-(A)_a-NR^7R^8$, $-O-CO-NR^{7'}R^{8'}$, $-S(O)_b-R^9$, $-P(O)(OR^{10})(OR^{11})$,

 ,  ,

 and/or 

in which

a and b are identical or different and each represents a number 0 or 1,

A represents a radical CO or SO_2,

R^7, $R^{7'}$, R^8 and $R^{8'}$ are identical or different and each represents hydrogen, or cyclopropyl, cyclopentyl, cyclohexyl, cycloheptyl, phenyl, piperidinyl and pyridyl, where the abovementioned ring systems are optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, nitro, trifluoromethyl, trifluoromethoxy, carboxyl, fluorine, chlorine, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, or by a group of the formula $-(SO_2)_c-NR^{12}R^{13}$,

in which

c represents a number 0 or 1,

R^{12} and R^{13} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

or

R^7, $R^{7'}$, R^8 and $R^{8'}$ each represent straight-chain or branched alkoxy having up to 3 carbon atoms, or
represents straight-chain or branched alkyl having up to 7 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, phenyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, or by a group of the formula $-(CO)_d-NR^{14}R^{15}$,

in which

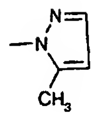
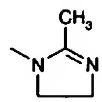
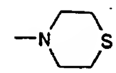
R^{14} and R^{15} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

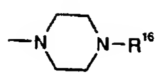
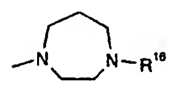
and

d represents a number 0 or 1,

or

R^7 and R^8 and/or $R^{7'}$ and $R^{8'}$ together with the nitrogen atom form a pyrrolidinyl, morpholinyl, piperidinyl or triazolyl ring or radicals of the formulae

 ,  ,  ,

 or 

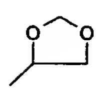
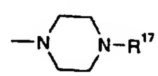
in which

R^{16} represents hydrogen, phenyl, benzyl, morpholinyl, pyrrolidinyl, piperidinyl, piperazinyl or N-methylpiperazinyl, or represents straight-chain or branched alkyl having up to 5 carbon atoms which is optionally substituted by hydroxyl,

R^9 represents straight-chain or branched alkyl having up to 3 carbon atoms,

R^{10} and R^{11} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

and/or the alkyl chain listed under R^3/R^4 is optionally substituted by cyclopropyl, cyclopentyl, cyclohexyl, cycloheptyl, phenyl, pyridyl, quinolyl, pyrrolidinyl, pyrimidyl, morpholinyl, furyl, piperidinyl, tetrahydrofuranyl or by radicals of the formulae

 or 

in which

R^{17} represents hydrogen, hydroxyl, formyl, trifluoromethyl, straight-chain or branched acyl or alkoxy having in each case up to 3 carbon atoms,

or represents straight-chain or branched alkyl having up to 4 carbon atoms which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl and straight-chain or branched alkoxy having up to 4 carbon atoms,

and where phenyl and the heterocycles are optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of nitro, fluorine, chlorine, $-SO_3H$, straight-chain or branched alkyl or alkoxy having in each case up to 4 carbon atoms, hydroxyl, and/or by a radical of the formula $-SO_2.NR^{18}R^{19}$,

in which

R^{18} and R^{19} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

and/or

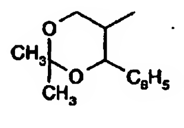
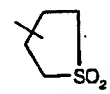
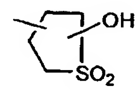
R^3 or R^4 represents a group of the formula $-NR^{20}R^{21}$,

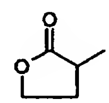
in which

R^{20} and R^{21} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

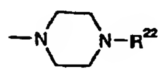
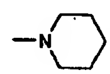
and/or

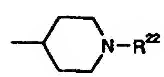
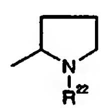
R^3 or R^4 represents adamantyl, or represents radicals of the formulae

,  

or ,

or represents cyclopentyl, cyclohexyl, cycloheptyl, phenyl, morpholinyl, oxazolyl, thiazolyl, quinolyl, isoxazolyl, pyridyl, tetrahydrofuranyl, tetrahydropyranyl or represents radicals of the formulae

, ,

 or ,

in which

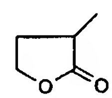
R^{22} has the meaning of R^{16} given above and is identical to or different from it, or represents carboxyl, formyl or straight-chain or branched acyl having up to 3 carbon atoms,

and where cycloalkyl, phenyl and/or the heterocycles are optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of fluorine, chlorine, triazolyl, trifluoromethyl, trifluoromethoxy, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 5 carbon atoms, nitro and/or by groups of the formulae $-SO_3H$, $-OR^{23}$, $(SO_2)_eNR^{24}R^{25}$, $-P(O)(OR^{26})(OR^{27})$,

in which

e represents a number 0 or 1,

R^{23} represents a radical of the formula



, or

represents cyclopropyl, cyclopentyl, cyclobutyl, cyclohexyl or cycloheptyl,

represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms which may optionally be substituted by cyclopropyl, cyclopentyl, cyclohexyl, benzyloxy, tetrahydropyranyl, tetrahydrofuranyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, benzyloxycarbonyl or phenyl which for its part may be mono- or polysubstituted by identical or different substituents selected from the group consisting of straight-chain or branched alkoxy having up to 3 carbon atoms, hydroxyl, fluorine and chlorine,

and/or where alkyl is optionally substituted by radicals of the formulae -CO-NR^{28}R^{29} or -CO-R^{30},

in which

R^{28} and R^{29} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 5 carbon atoms, or

R^{28} and R^{29} together with the nitrogen atom form a morpholinyl, pyrrolidinyl or piperidinyl ring,

and

R^{30} represents phenyl or adamantyl,

R^{24} and R^{25} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

R^{26} and R^{27} have the meanings of R^{10} and R^{11} given above and are identical to or different from them

and/or cycloalkyl, phenyl and/or the heterocycles are optionally substituted by straight-chain or branched alkyl having up to 4 carbon atoms which is optionally substituted by hydroxyl, carboxyl, pyridyl, pyrimidyl, pyrrolidinyl, piperidinyl, tetrahydrofuranyl, triazolyl or by groups of the formula -SO$_2$-R^{31}, -P(O)(OR^{32})(OR^{33}) or -NR^{34}R^{35},

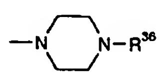
in which

R^{31} has the meaning of R^9 given above and is identical to or different from it,

R^{32} and R^{33} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{34} and R^{35} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 5 carbon atoms which is optionally substituted by hydroxyl or straight-chain or branched alkoxy having up to 3 carbon atoms, or

R^{34} and R^{35} together with the nitrogen atom form a morpholinyl, triazolyl or thiomorpholinyl ring or a radical of the formula

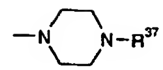


in which

R^{36} represents hydrogen, hydroxyl, straight-chain or branched alkoxycarbonyl having up to 5 carbon atoms or straight-chain or branched alkyl having up to 4 carbon atoms which is optionally substituted by hydroxyl,

or

R^3 and R^4 together with the nitrogen atom form a morpholinyl, thiomorpholinyl, pyrrolidinyl, piperidinyl ring, or a radical of the formula



in which

R^{37} represents hydrogen, hydroxyl, formyl, trifluoromethyl, straight-chain or branched acyl, alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms,
or represents straight-chain or branched alkyl having up to 5 carbon atoms which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, trifluoromethyl, carboxyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, or by groups of the formula $-(D)_f-NR^{38}R^{39}$, $-CO-(CH_2)_g-O-CO-R^{40}$, $-CO-(CH_2)_h-OR^{41}$ or $-P(O)(OR^{42})(OR^{43})$,

in which

g and h are identical or different and each represents a number 1, 2 or 3,

and

f represents a number 0 or 1,

D represents a group of the formula -CO or $-SO_2$,

R^{38} and R^{39} are identical or different and have the meanings of R^7 and R^8 given above,

R^{40} represents straight-chain or branched alkyl having up to 4 carbon atoms,

R^{41} represents straight-chain or branched alkyl having up to 4 carbon atoms,

R^{42} and R^{43} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

or

R^{37} represents a radical of the formula $-(CO)_i-E$,

in which

i represents a number 0 or 1,

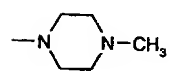
E represents cyclopentyl, cyclohexyl, cycloheptyl, benzyl, phenyl, pyridyl, pyrimidyl or furyl, where the abovementioned ring systems are optionally mono- or disubstituted by identical or different substituents selected from the group consisting of nitro, fluorine, chlorine, $-SO_3H$, straight-chain or branched alkoxy having up to 4 carbon atoms, hydroxyl, trifluoromethyl, trifluoromethoxy or by a radical of the formula $-SO_2-NR^{44}R^{45}$,

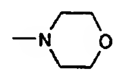
in which

R^{44} and R^{45} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

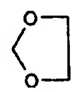
or

E represents radicals of the formulae



or  ,

and the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally mono- to trisubstituted, optionally also geminally, by identical or different substituents selected from the group consisting of hydroxyl, formyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 5 carbon atoms, nitro and groups of the formulae $-P(O)(OR^{46})(OR^{47})$,

 , $=NR^{48}$ or $-(CO)_jNR^{49}R^{50}$

in which

R^{46} and R^{47} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{48} represents hydroxyl or straight-chain or branched alkoxy having up to 3 carbon atoms,

j represents a number 0 or 1,

and

R^{49} and R^{50} are identical or different and have the meanings of R^{14} and R^{15} given above,

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by straight-chain or branched alkyl having up to 5 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, carboxyl, cyclopropyl, cyclopentyl, cyclohexyl, cycloheptyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, or by a radical of the formula $-SO_3H$, $-NR^{51}R^{52}$ or $-P(O)OR^{53}OR^{54}$,

in which

R^{51} and R^{52} are identical or different and each represents hydrogen, phenyl, carboxyl, benzyl or straight-chain or branched alkyl or alkoxy having in each case up to 4 carbon atoms,

R^{53} and R^{54} are identical or different and have the meanings of R^{10} and R^{11} given above,

and/or the alkyl is optionally substituted by phenyl which for its part may be mono- to trisubstituted by identical or different substituents selected from the group consisting of fluorine, chlorine, hydroxyl,

straight-chain or branched alkoxy having up to 4 carbon atoms, or by a group of the formula $-NR^{51'}R^{52'}$,

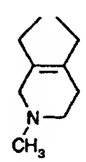
in which

$R^{51'}$ and $R^{52'}$ have the meanings of R^{51} and R^{52} given above and are identical to or different from them,

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by phenyl, pyridyl, piperidinyl, pyrrolidinyl or tetrazolyl, optionally also attached via a nitrogen function, where the ring systems for their part may be substituted by hydroxyl or by straight-chain or branched alkyl or alkoxy having in each case up to 5 carbon atoms,

or

R^3 and R^4 together with the nitrogen atom form radicals of the formulae



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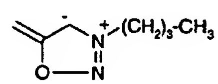

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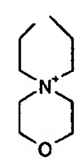

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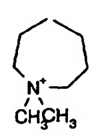

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R^5 and R^6 are identical or different and each represents hydrogen, hydroxyl or represents straight-chain or branched alkoxy having up to 4 carbon atoms,

and their salts, N-oxides, hydrates and isomeric forms.

Particular preference is given to compounds of the general formula (I) according to the invention

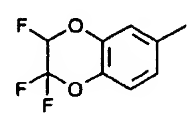
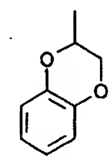
in which

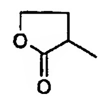
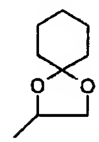
R^1 represents straight-chain or branched alkyl having up to 3 carbon atoms,

R^2 represents straight-chain alkyl having up to 3 carbon atoms,

R^3 and R^4 are identical or different and each represents hydrogen or represents straight-chain or branched alkenyl or alkoxy having in each case up to 4 carbon atoms, or

represents a straight-chain or branched alkyl chain having up to 6 carbon atoms which is optionally interrupted by an oxygen atom and which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, carboxyl, straight-chain or branched alkoxycarbonyl having up to 4 carbon atoms, and/or by radicals of the formulae $-SO_3H$, $-(A)_a-NR^7R^8$, $-O-CO-NR^{7'}R^{8'}$, $-S(O)_b-R^9$, $-P(O)(OR^{10})(OR^{11})$,

 ,  ,

 and/or 

in which

a and b are identical or different and each represents a number 0 or 1,

A represents a radical CO or SO_2,

R^7, $R^{7'}$, R^8 and $R^{8'}$ are identical or different and each represents hydrogen, or

represents cyclopentyl, cyclohexyl, cycloheptyl, phenyl, piperidinyl and pyridyl, where the abovementioned ring systems are optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, nitro, carboxyl, fluorine, chlorine, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by a group of the formula $-(SO_2)_c-NR^{12}R^{13}$,

in which

c represents a number 0 or 1,

R^{12} and R^{13} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

or

R^7, $R^{7'}$, R^8 and $R^{8'}$ each represent methoxy, or represent straight-chain or branched alkyl having up to 6 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, phenyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by a group of the formula $-(CO)_d-NR^{14}R^{15}$,

in which

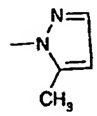
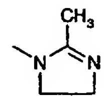
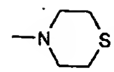
R^{14} and R^{15} are identical or different and each represents hydrogen, methyl or ethyl,

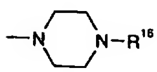
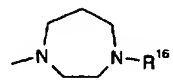
and

d represents a number 0 or 1,

or

R^7 and R^8 and/or $R^{7'}$ and $R^{8'}$ together with the nitrogen atom form a morpholinyl, piperidinyl or triazolyl ring or radicals of the formulae

 ,  ,  ,

 or 

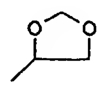
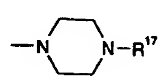
in which

R^{16} represents hydrogen, phenyl, benzyl, morpholinyl, pyrrolidinyl, piperidinyl, piperazinyl or N-methylpiperazinyl, or represents straight-chain or branched alkyl having up to 3 carbon atoms which is optionally substituted by hydroxyl,

R^9 represents methyl,

R^{10} and R^{11} are identical or different and each represents hydrogen, methyl or ethyl,

and/or the alkyl chain listed under R^3/R^4 is optionally substituted by cyclopropyl, cyclopentyl, cyclohexyl, cycloheptyl, morpholinyl, furyl, tetrahydrofuranyl, or by radicals of the formulae

 or 

in which

R^{17} represents hydrogen, hydroxyl, formyl, acetyl or alkoxy having up to 3 carbon atoms,
or represents straight-chain or branched alkyl having up to 3 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl and straight-chain or branched alkoxy having up to 3 carbon atoms,

and where phenyl and the heterocycles are optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of fluorine, chlorine, $-SO_3H$, straight-chain or branched alkyl or alkoxy having in each case up to 3 carbon atoms, hydroxyl, and/or by a radical of the formula $-SO_2NR^{18}R^{19}$,

in which

R^{18} and R^{19} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

and/or

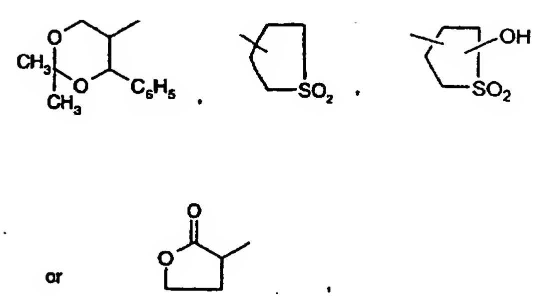
R^3 or R^4 represents a group of the formula $-NR^{20}R^{21}$,

in which

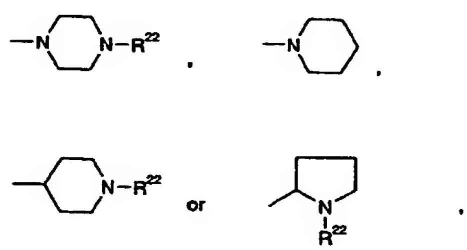
R^{20} and R^{21} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

and/or

R^3 or R^4 represents adamantyl, or represents radicals of the formulae



or represents cyclopentyl, cyclohexyl, cycloheptyl, phenyl, morpholinyl, oxazolyl, thiazolyl, quinolyl, isoxazolyl, pyridyl, tetrahydrofuranyl, tetrahydropyranyl, or represents radicals of the formulae



in which

R^{22} has the meaning of R^{16} given above and is identical to or different from it, or represents formyl or acetyl,

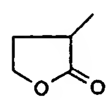
and where cycloalkyl, phenyl and/or the heterocycles are optionally mono- or disubstituted by identical or different substituents selected

from the group consisting of fluorine, chlorine, triazolyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 4 carbon atoms, nitro, and/or by groups of the formulae $-SO_3H$, $-OR^{23}$, $(SO_2)_eNR^{24}R^{25}$, $-P(O)(OR^{26})(OR^{27})$,

in which

e represents a number 0 or 1,

R^{23} represents a radical of the formula



, or

represents cyclopropyl, cyclopentyl, cyclobutyl or cyclohexyl, represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms which is optionally substituted by cyclopropyl, cyclohexyl, benzyloxy, tetrahydropyranyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, benzyloxycarbonyl or phenyl which for its part may be mono- or disubstituted by identical or different substituents selected from the group consisting of methoxy, hydroxyl, fluorine or chlorine,

and/or where alkyl is optionally substituted by radicals of the formulae $-CO-NR^{28}R^{29}$ or $-CO-R^{30}$,

in which

R^{28} and R^{29} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms, or

R^{28} and R^{29} together with the nitrogen atom form a morpholinyl, pyrrolidinyl or piperidinyl ring,

and

R^{30} represents phenyl or adamantyl,

R^{24} and R^{25} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

R^{26} and R^{27} have the meanings of R^{10} and R^{11} given above and are identical to or different from them

and/or cycloalkyl, phenyl and/or the heterocycles are optionally substituted by straight-chain or branched alkyl having up to 3 carbon atoms which is optionally substituted by hydroxyl, carboxyl, pyridyl, pyrimidyl, pyrrolidinyl, piperidinyl, tetrahydrofuranyl, triazolyl or by groups of the formula $-SO_2-R^{31}$, $P(O)(OR^{32})(OR^{33})$ or $-NR^{34}R^{35}$,

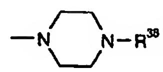
in which

R^{31} represents methyl,

R^{32} and R^{33} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{34} and R^{35} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms which is optionally substituted by hydroxyl or methoxy, or

R^{34} and R^{35} together with the nitrogen atom form a morpholinyl, triazolyl or thiomorpholinyl ring, or a radical of the formula



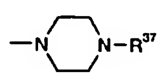
,

in which

R^{36} represents hydrogen, hydroxyl, straight-chain or branched alkoxycarbonyl having up to 3 carbon atoms or straight-chain or branched alkyl having up to 3 carbon atoms which is optionally substituted by hydroxyl,

or

R^3 and R^4 together with the nitrogen atom form a morpholinyl, thiomorpholinyl, pyrrolidinyl, piperidinyl ring, or a radical of the formula



,

in which

R^{37} represents hydrogen, hydroxyl, formyl, straight-chain or branched acyl, alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms,

or represents straight-chain or branched alkyl having up to 4 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by groups of the formula $-(D)_f-NR^{38}R^{39}$, $-CO-(CH_2)_g-O-CO-R^{40}$, $-CO-(CH_2)_h-OR^{41}$ or $-P(O)(OR^{42})(OR^{43})$,

in which

g and h are identical or different and each represents a number 1 or 2,

and

f represents a number 0 or 1,

D represents a group of the formula -CO or $-SO_2$,

R^{38} and R^{39} are identical or different and have the meanings of R^7 and R^8 given above,

R^{40} represents straight-chain or branched alkyl having up to 3 carbon atoms,

R^{41} represents straight-chain or branched alkyl having up to 3 carbon atoms,

R^{42} and R^{43} are identical or different and each represents hydrogen, methyl or ethyl,

or

R^{37} represents a radical of the formula $-(CO)_i-E$,

in which

i represents a number 0 or 1,

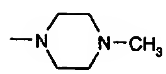
E represents cyclopentyl, benzyl, phenyl, pyridyl, pyrimidyl or furyl, where the abovementioned ring systems are optionally mono- or disubstituted by identical or different substituents selected from the group consisting of nitro, fluorine, chlorine, $-SO_3H$, straight-chain or branched alkoxy having up to 3 carbon atoms, hydroxyl, or by a radical of the formula $-SO_2-NR^{44}R^{45}$,

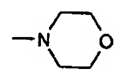
in which

R^{44} and R^{45} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

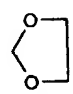
or

E represents radicals of the formulae



or  ,

and the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally mono- to trisubstituted, optionally also geminally, by identical or different substituents selected from the group consisting of hydroxyl, formyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 3 carbon atoms, or groups of the formulae $-P(O)(OR^{46})(OR^{47})$,

 , $=NR^{48}$ or $-(CO)_jNR^{49}R^{50}$

in which

R^{46} and R^{47} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{48} represents hydroxyl or methoxy,

j represents a number 0 or 1,

and

R^{49} and R^{50} are identical or different and have the meanings of R^{14} and R^{15} given above,

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by straight-chain or branched alkyl having up to 4 carbon atoms which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, carboxyl, cyclopropyl, cycloheptyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by a radical of the formula $-SO_3H$, $-NR^{51}R^{52}$ or $P(O)OR^{53}OR^{54}$,

in which

R^{51} and R^{52} are identical or different and each represents hydrogen, phenyl, carboxyl, benzyl or straight-chain or branched alkyl or alkoxy having in each case up to 3 carbon atoms,

R^{53} and R^{54} are identical or different and have the meanings of R^{10} and R^{11} given above,

and/or the alkyl is optionally substituted by phenyl which for its part may be mono- to disubstituted by identical or different substituents selected from the group consisting of fluorine, chlorine, hydroxyl, methoxy, or by a group of the formula $-NR^{51'}R^{52'}$,

in which

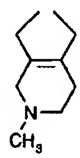
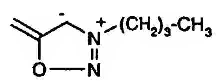
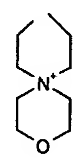
$R^{51'}$ and $R^{52'}$ have the meanings of R^{51} and R^{52} given above and are identical to or different from them,

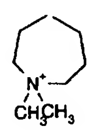
and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by phenyl, pyridyl, piperidinyl, pyrrolidinyl or tetrazolyl, if appropriate also

attached via a nitrogen function, where the ring systems for their part may be substituted by hydroxyl or by straight-chain or branched alkyl or alkoxy having in each case up to 3 carbon atoms,

or

R^3 and R^4 together with the nitrogen atom form radicals of the formulae

 ,  , 

or  ,

R^5 and R^6 are identical or different and each represents hydrogen, hydroxyl or represents straight-chain or branched alkoxy having up to 3 carbon atoms,

and their salts, N-oxides, hydrates and isomeric forms.

Very particular preference is given to compounds of the general formula (I),

in which

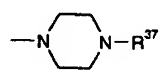
R^1 represents methyl or ethyl,

R^2 represents ethyl or propyl,

R^3 and R^4 are identical or different and each represents a straight-chain or branched alkyl chain having up to 5 carbon atoms which is optionally substituted up to two times by identical or different substituents selected from the group consisting of hydroxyl and methoxy,

or

R^3 and R^4 together with the nitrogen atom form a piperidinyl, morpholinyl, thiomorpholinyl ring, or a radical of the formula



in which

R^{37} represents hydrogen, formyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 3 carbon atoms, or represents straight-chain or branched alkyl having up to 3 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, carboxyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by groups of the formulae $-(D)_f-NR^{38}R^{39}$ or $-P(O)(OR^{42})(OR^{43})$,

in which

f represents a number 0 or 1,

D represents a group of the formula -CO,

R^{38} and R^{39} are identical or different and each represents hydrogen or methyl,

R^{42} and R^{43} are identical or different and each represents hydrogen, methyl or ethyl,

or

R^{37} represents cyclopentyl,

and the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally mono- or disubstituted, optionally also geminally, by identical or different substituents selected from the group consisting of hydroxyl, formyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 3 carbon atoms, or groups of the formulae $-P(O)(OR^{46})(OR^{47})$ or $-(CO)_jNR^{49}R^{50}$,

in which

R^{46} and R^{47} are identical or different and each represents hydrogen, methyl or ethyl,

j represents a number 0 or 1,

and

R^{49} and R^{50} are identical or different and each represents hydrogen or methyl

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by straight-chain or branched alkyl having up to 3 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, carboxyl, or by a radical of the formula $P(O)OR^{53}OR^{54}$,

in which

R^{53} and R^{54} are identical or different and each represents hydrogen, methyl or ethyl,

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by pyrrolidinyl or piperidinyl attached via nitrogen,

R^5 represents hydrogen,

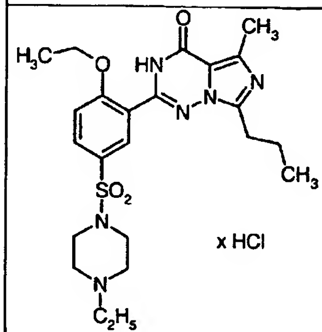
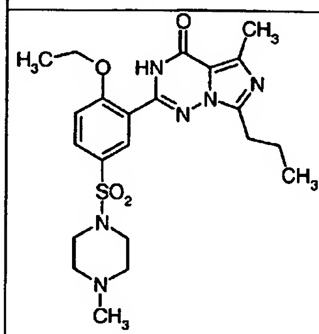
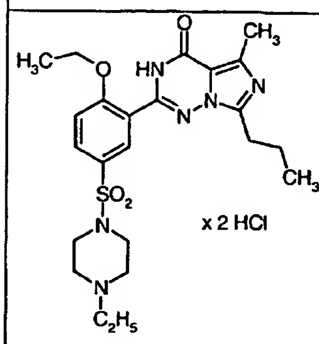
and

R^6 represents ethoxy or propoxy,

and their salts, hydrates, N-oxides and isomeric forms.

Likewise, very particular preference is given to those compounds of the general formula (I) according to the invention in which R^5 represents hydrogen and the radicals R^6 and $-SO_2NR^3R^4$ are in a position para to one another at the phenyl ring. Particularly preferred compounds are listed in Table A.

Table A:

Structure




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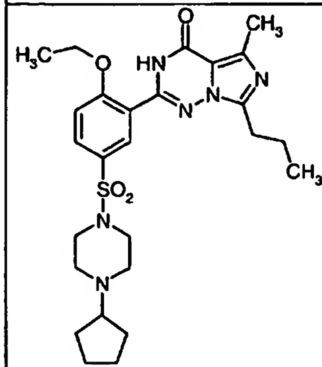
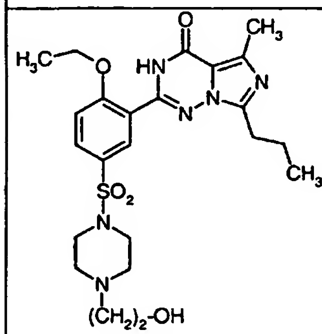
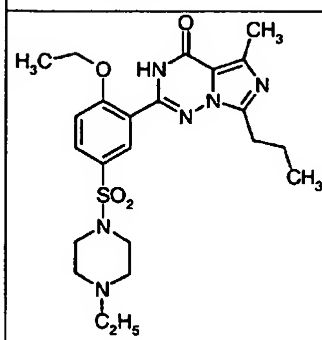

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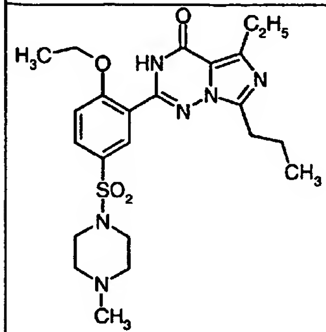
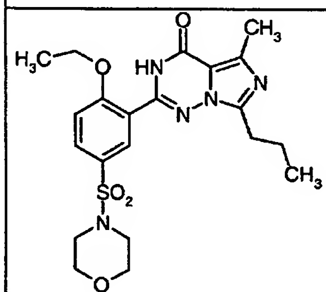
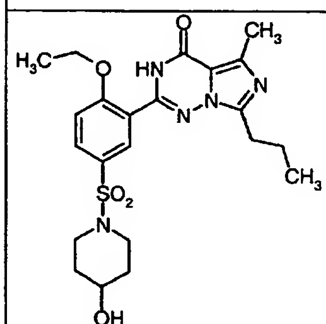

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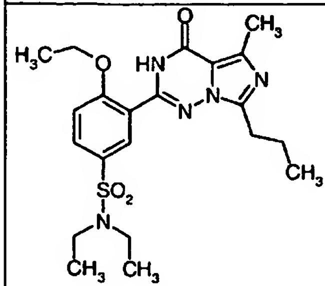
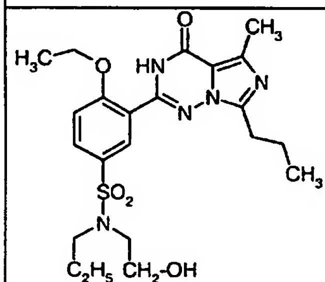
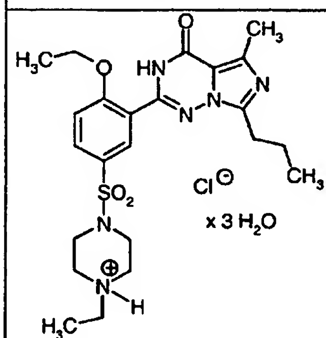
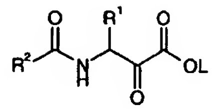




The invention furthermore provides a process for preparing the compounds of the general formula (I) according to the invention, characterized in that

initially compounds of the general formula (II)



(II)

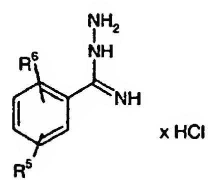
in which

R^1 and R^2 are each as defined above

and

L represents straight-chain or branched alkyl having up to 4 carbon atoms,

are converted with compounds of the general formula (III)

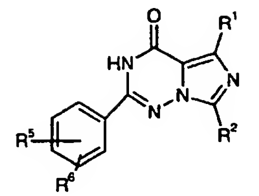


(III)

in which

R^5 and R^6 are each as defined above,

in a two-step reaction in the systems ethanol and phosphorus oxytrichloride/ dichloroethane into the compounds of the general formula (IV)

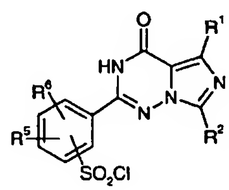


(IV)

in which

R^1, R^2, R^5 and R^6 are each as defined above,

which are reacted in a further step with chlorosulphonic acid to give the compounds of the general formula (V)



(V)

in which

R^1, R^2, R^5 and R^6 are each as defined above,

which are finally reacted with amines of the general formula (VI)

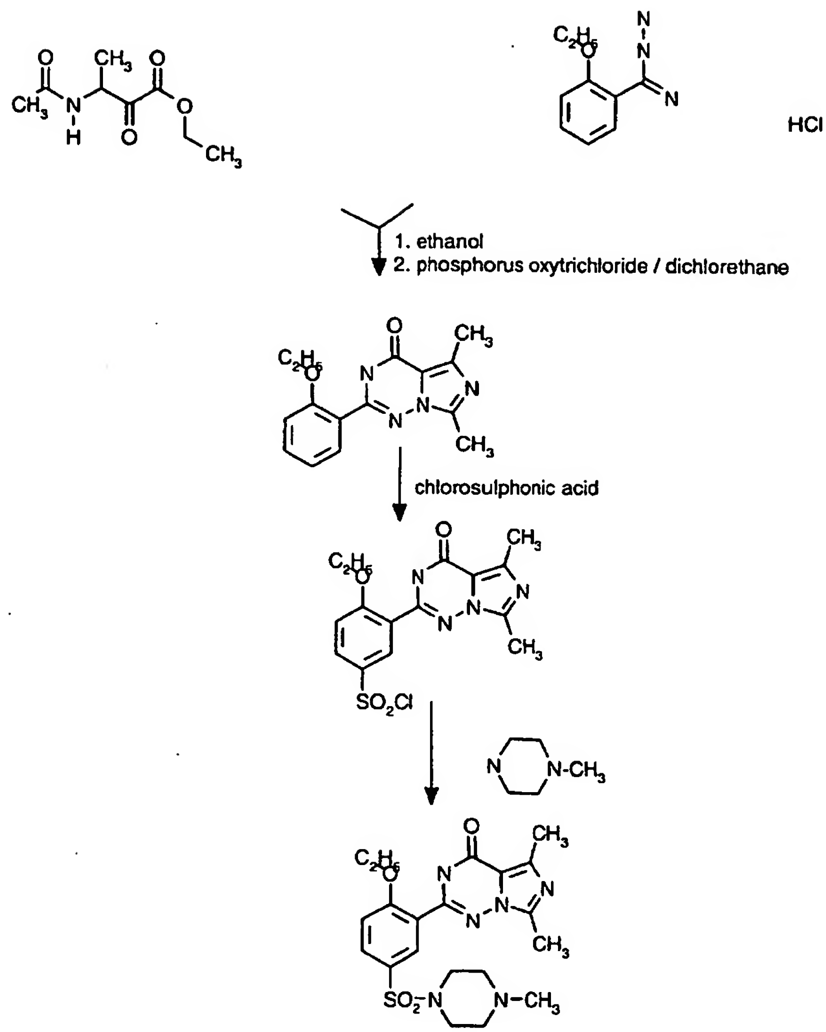
HN^3R^4 (VI)

in which

R^3 and R^4 are each as defined above,

in inert solvents.

The process according to the invention can be illustrated using the following scheme as an example:



Solvents which are suitable for the individual steps are the customary organic solvents which do not change under the reaction conditions. These preferably include ethers, such as diethyl ether, dioxane, tetrahydrofuran, glycol dimethyl ether, or hydrocarbons, such as benzene, toluene, xylene, hexane, cyclohexane or mineral oil fractions, or

halogenated hydrocarbons, such as dichloromethane, trichloromethane, carbon tetrachloride, dichloroethane, trichloroethylene or chlorobenzene, or ethyl acetate, dimethylformamide, hexamethylphosphoric triamide, acetonitrile, acetone, dimethoxyethane or pyridine. It is also possible to use mixtures of the abovementioned solvents. Particular preference is given to ethanol for the first step and dichloroethane for the second step.

The reaction temperature can generally be varied within a relatively wide range. In general, the reaction is carried out in a range of from -20°C to 200°C, preferably of from 0°C to 70°C.

The process steps according to the invention are generally carried out under atmospheric pressure. However, it is also possible to operate under superatmospheric pressure or under reduced pressure (for example, in a range of from 0.5 to 5 bar).

The reaction to give the compounds of the general formula (V) is carried out in a temperature range of from 0°C to room temperature, and at atmospheric pressure.

The reaction with the amines of the general formula (VI) is carried out in one of the abovementioned chlorinated halogens, preferably in dichloromethane.

The reaction temperature can generally be varied within a relatively wide range. In general, the reaction is carried out at temperatures in a range of from -20°C to 200°C, preferably of from 0°C to room temperature.

The reaction is generally carried out at atmospheric pressure. However, it is also possible to operate under superatmospheric pressure or under reduced pressure (for example in a range of from 0.5 to 5 bar).

Some of the compounds of the general formula (II) are known, or they are novel, and they can then be prepared by

converting compounds of the general formula (VII)

$$R^2\text{-CO-T} \qquad \text{(VII)}$$

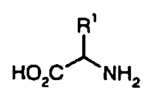
in which

R^2 is as defined above

and

T represents halogen, preferably chlorine,

initially by reaction with compounds of the general formula (VIII)

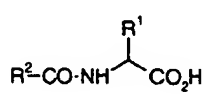


(VIII)

in which

R^1 is as defined above

in inert solvents, if appropriate in the presence of a base and trimethylsilyl chloride, into the compounds of the general formula (IX)

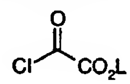


(IX)

in which

R^1 and R^2 are each as defined above,

and finally reacting with the compound of the formula (X)



(X)

in which L is as defined above,

in inert solvents, if appropriate in the presence of a base.

Suitable solvents for the individual steps of the process are the customary organic solvents which do not change under the reaction conditions. These preferably include ethers, such as diethyl ether, dioxane, tetrahydrofuran, glycol dimethyl ether, or hydrocarbons, such as benzene, toluene, xylene, hexane, cyclohexane or mineral oil fractions, or halogenated hydrocarbons, such as dichloromethane, trichloromethane, carbon tetrachloride, dichloroethylene, trichloroethylene or chlorobenzene, or ethyl acetate, dimethylformamide, hexamethylphosphoric triamide, acetonitrile, acetone, dimethoxyethane or pyridine. It is also possible to use mixtures of the abovementioned solvents. Particular preference is given to dichloromethane for the first step and to a mixture of tetrahydrofuran and pyridine for the second step.

Suitable bases are generally alkali metal hydrides or alkali metal alkoxides, such as, for example, sodium hydride or potassium tert-butoxide, or cyclic amines, such as, for example, piperidine, pyridine, dimethylaminopyridine or C_1-C_4 alkylamines, such as, for example, triethylamine. Preference is given to triethylamine, pyridine and/or dimethylaminopyridine.

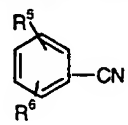
The base is generally employed in an amount of from 1 mol to 4 mol, preferably from 1.2 mol to 3 mol, in each case based on 1 mol of the compound of the formula (X).

The reaction temperature can generally be varied within a relatively wide range. In general, the reaction is carried out in a range of from -20°C to 200°C, preferably of from 0°C to 100°C.

The compounds of the general formulae (VII), (VIII), (IX) and (X) are known per se, or they can be prepared by customary methods.

The compounds of the general formula (III) can be prepared by

reacting compounds of the general formula (XI)



(XI)

in which

R^5 and R^6 are each as defined above

with ammonium chloride in toluene and in the presence of trimethylaluminium in hexane in a temperature range of from -20°C to room temperature, preferably at 0°C and atmospheric pressure, and reacting the resulting amidine, if appropriate in situ, with hydrazine hydrate.

The compounds of the general formula (XI) are known per se, or they can be prepared by customary methods.

Some of the compounds of the general formula (IV) are known, or they are novel, in which case they can be prepared by known methods [cf. David R. Marshall, Chemistry and Industry, 2 May 1983, 331-335].

Compounds of the general formula (V) are novel per se, however, they can be prepared from the compounds of the general formula (IV) in accordance with the publication Organikum, VEB Deutscher Verlag der Wissenschaften, Berlin 1974, pages 338 - 339.

The compounds of the general formula (I) according to the invention have an unforeseeable useful pharmacological activity spectrum.

They inhibit either one or more of the cGMP-metabolizing phosphodiesterases (PDE I, PDE II and PDE V). This results in an increase of cGMP. The differentiated expression of the phosphodiesterases in different cells, tissues and organs, as well as the differentiated subcellular localization of these enzymes, in combination with the selective inhibitors according to the invention make it possible to selectively address the various cGMP-regulated processes.

Moreover, the compounds according to the invention enhance the activity of substances such as, for example EDRF (endothelium derived relaxing factor), ANP (atrial natriuretic peptide), of nitrovasodilators and all other substances which increase the cGMP concentration in a manner different from that of phosphodiesterase inhibitors.

They can therefore be employed in pharmaceuticals for treating cardiovascular disorders, such as, for example, for treating hypertension, neuronal hypertonia, stable and unstable angina, peripheral and cardial vascularpathies, arrhythmiae, for treating thromboembolic disorders and ischaemias such as myocardial infarction, stroke, transistory and ischaemic attacks, angina pectoris, obstruction of peripheral circulation, prevention of restenoses after thrombolysis therapy, percutaneous transluminal angioplasty (PTA), percutaneous transluminal coronary angioplasties (PTCA) and bypass. Furthermore, they may also be of significance for cerebrovascular disorders. Owing to their relaxing action on smooth muscles, they are suitable for treating disorders of the urogenital system such as hypertrophy of the prostate, incontinence and in particular for treating erectile dysfunction and female sexual dysfunction.

Activity of the phosphodiesterases (PDEs)

The cGMP-stimulated PDE II, the cGMP-inhibited PDE III and the cAMP-specific PDE IV were isolated either from porcine or bovine heart myocardium. The Ca^{2+}-calmodulin-stimulated PDE I was isolated from porcine aorta, porcine brain or, preferably, from bovine aorta. The cGMP-specific PDE V was obtained from porcine small intestine, porcine aorta, human platelets and, preferably, from bovine aorta. Purification was carried out by anion exchange chromatography over MonoQ® Pharmacia, essentially following the method of M. Hoey and Miles D. Houslay, Biochemical Pharmacology, Vol. 40, 193-202 (1990) and C. Lugman et al., Biochemical Pharmacology, Vol. 35, 1743-1751 (1986).

The enzyme activity is determined using a test mixture of 100 ml in 20 mM tris/HCl-buffer pH 7.5 containing 5 mM $MgCl_2$, 0.1 mg/ml of bovine serum albumin and either 800 Bq[^{3}H]cAMP or [^{3}H]cGMP. The final concentration of the nucleotides in question is 10^{-6} mol/l. The reaction is initiated by addition of the enzyme and the amount of enzyme is such that during the incubation time of 30 min, approximately 50% of the substrate are converted. To test the cGMP-stimulated PDE II, [^{3}H]cAMP is used as substrate and 10^{-6} mol/l of non-labelled cGMP are added to the mixture. To test the Ca^{2+}-calmodulin-dependent PDE I, 1 mM of $CaCl_2$ and 0.1 mM of calmodulin are added to the reaction mixture. The reaction is quenched by addition of 100 ml of acetonitrile containing 1 mM cAMP and 1 mM AMP. 100 ml of the reaction mixture are separated by HPLC, and the cleavage products are determined quantitatively on-line using a continuous scintillation counter. The substance concentration measured is the concentration at which the reaction rate is reduced by 50%. Additionally, the "phosphodiesterase [^{3}H] cAMP-SPA enzyme assay" and the "phosphodiesterase [^{3}H] cGMP-SPA enzyme assay" from Amersham Life Science were used for testing. The test was carried out according to the test protocol of the manufacturer. To determine the activity of PDE II, the [^{3}H]cAMP SPA assay was used, and 10^{-6} M cGMP were added to the reaction mixture to activate the enzyme. To measure PDE I, 10^{-7} M calmodulin

and 1 mM $CaCl_2$ were added to the reaction mixture. PDE V was measured using the [^{3}H]cGMP SPA assay.

Inhibition of the phosphodiesterases in vitro

Ex. No.	PDE I IC_{50} [nM]	PDE II IC_{50} [nM]	PDE V IC_{50} [nM]
16	300	>1000	2
19	200	>1000	2
20	200	>1000	2
26	100	>1000	1
27	200	>1000	3
32	100	>1000	4
260	300	>1000	10
275	50	>1000	3
338	200	>1000	5

In principle, inhibition of one or more phosphodiesterases of this type results in an increase of the cGMP concentration. Thus, the compounds are of interest for all therapies in which an increase of the cGMP concentration is considered to be beneficial.

The cardiovascular effects were investigated using SH-rats and dogs. The substances were administered intravenously or orally.

The erection-stimulating action was investigated using rabbits which were awake [Naganuma H, Egashira T, Fuji J, Clinical and Experimental Pharmacology and Physiology 20, 177-183 (1993)]. The substances were administered intravenously, orally or parenterally.

The novel active compounds and their physiologically acceptable salts (for example hydrochlorides, maleates or lactates) can be converted in a known manner into the customary formulations, such as tablets, coated tablets, pills, granules, aerosols, syrups,

emulsions, suspensions and solutions, using inert non-toxic, pharmaceutically suitable excipients or solvents. In this case the therapeutically active compound should in each case be present in a concentration from approximately 0.5 to 90% by weight of the total mixture, i.e. in amounts which are sufficient in order to achieve the dosage range indicated.

The formulations are prepared, for example, by extending the active compounds using solvents and/or excipients, if appropriate using emulsifiers and/or dispersants, it optionally being possible, for example, to use organic solvents as auxiliary solvents if the diluent used is water.

Administration is carried out in a customary manner, preferably orally, transdermally or parenterally, for example perlingually, buccally, intravenously, nasally, rectally or inhalatively.

For human use, in the case of oral administration, it is good practice to administer doses of from 0.001 to 50 mg/kg, preferably of 0.01 mg/kg - 20 mg/kg. In the case of parenteral administration, such as, for example, via mucous membranes nasally, buccally or inhalatively, it is good practice to use doses of 0.001 mg/kg - 0.5 mg/kg.

In spite of this, if appropriate it may be necessary to depart from the amounts mentioned, namely depending on the body weight or the type of administration route, on the individual response towards the medicament, the manner of its formulation and the time or interval at which administration takes place. Thus, in some cases it may be adequate to manage with less than the abovementioned minimum amounts, while in other cases the upper limit mentioned has to be exceeded. In the case of the administration of relatively large amounts, it may be advisable to divide these into several individual doses over the course of the day.

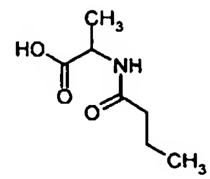
The compounds according to the invention are also suitable for use in veterinary medicine. For use in veterinary medicine, the compounds or their non-toxic salts can be

administered in a suitable formulation in accordance with general veterinary practice. Depending on the kind of animal to be treated, the veterinary surgeon can determine the nature of use and the dosage.

Starting materials

Example 1A

2-Butyrylaminopropionic acid



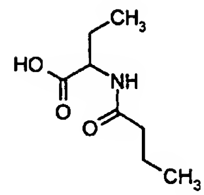
22.27 g (250 mmol) of D,L-alanine and 55.66 g (550 mmol) of triethylamine are dissolved in 250 ml of dichloromethane, and the solution is cooled to 0°C. 59.75 g (550 mmol) of trimethylsilyl chloride are added dropwise, and the solution is stirred for 1 hour at room temperature and for 1 hour at 40°C. After cooling to -10°C, 26.64 g (250 mmol) of butyryl chloride are added dropwise, and the resulting mixture is stirred for 2 hours at -10°C and for one hour at room temperature.

With ice-cooling, 125 ml of water are added dropwise and the reaction mixture is stirred at room temperature for 15 minutes. The aqueous phase is evaporated to dryness, the residue is titrated with acetone and the mother liquor is filtered off with suction. The solvent is removed and the residue is chromatographed. The resulting product is dissolved in 3N aqueous sodium hydroxide solution and the resulting solution is evaporated to dryness. The residue is taken up in conc. HCl and once more evaporated to dryness. The residue is stirred with acetone, precipitated solid is filtered off with suction and the solvent is removed under reduced pressure. This gives 28.2 g (71%) of a viscous oil which crystallizes after some time.

200 MHz ^{1}H-NMR (DMSO-d6): 0.84, t, 3H; 1.22, d, 3H; 1.50, hex, 2H; 2.07, t, 2H; 4.20, quin., 1H; 8.09, d, 1H.

Example 2A

2-Butyrylamino butyric acid



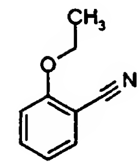
25.78 g of 2-aminobutyric acid (250 mmol) and 55.66 g (550 mmol) of triethylamine are dissolved in 250 ml of dichloromethane, and the solution is cooled to 0°C. 59.75 g (550 mmol) of trimethylsilyl chloride are added dropwise, and the solution is stirred for 1 hour at room temperature and for 1 hour at 40°C. After cooling to -10°C, 26.64g (250 mmol) of butyryl chloride are added dropwise, and the resulting mixture is stirred for 2 hours at -10°C and for one hour at room temperature.

With ice-cooling, 125 ml of water are added dropwise, and the reaction mixture is stirred at room temperature for 15 minutes. The organic phase is admixed with aqueous sodium hydroxide solution and the organic solvent is removed under reduced pressure. After acidification, the precipitated solid is stirred once with water and twice with petroleum ether and dried at 45°C under reduced pressure. This gives 29.1 g (67%) of a colourless solid.

200 MHz ^{1}H-NMR (DMSO-d6):0.88, 2t, 6H; 1.51, quart., 2H, 1.65, m, 2H, 2.09, t, 2H, 4.10, m, 1H; 8.01, d, 1H; 12.25, s, m 1H.

Example 3A

2-Ethoxybenzonitrile

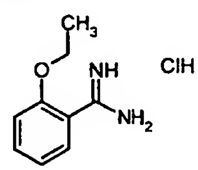


25 g (210 mmol) of 2-hydroxybenzonitrile are refluxed with 87 g of potassium carbonate and 34.3 g (314.8 mmol) of ethyl bromide in 500 ml of acetone overnight. The solid is filtered off, the solvent is removed under reduced pressure and the residue is distilled under reduced pressure. This gives 30.0 g (97%) of a colourless liquid.

200 MHz ^{1}H-NMR (DMSO-d6): 1.48, t, 3H; 4.15, quart., 2H; 6.99, dt, 2H; 7.51, dt, 2H.

Example 4A

2-Ethoxybenzamidine hydrochloride



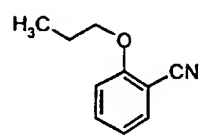
21.4 g (400 mmol) of ammonium chloride are suspended in 375 ml of toluene, and the suspension is cooled to 0°C. 200 ml of a 2M solution of trimethylaluminium in hexane are added dropwise, and the mixture is stirred at room temperature until the evolution of gas has ceased. After addition of 29.44 g (200 mmol) of 2-ethoxybenzonitrile, the reaction mixture is stirred at 80°C (bath) overnight.

With ice-cooling, the cooled reaction mixture is added to a suspension of 100 g of silica gel and 950 ml of chloroform, and the mixture is stirred at room temperature for 30 minutes. The mixture is filtered off with suction, and the filter residue is washed with the same amount of methanol. The mother liquor is concentrated, the resulting residue is stirred with a mixture of dichloromethane and methanol (9:1), the solid is filtered off with suction and the mother liquor is concentrated. This gives 30.4 g (76%) of a colourless solid.

200 MHz ^{1}H-NMR (DMSO-d6): 1.36, t, 3H; 4.12, quart., 2H; 7.10, t, 1H; 7.21, d, 1H; 7.52, m, 2H; 9.30, s, broad, 4H.

<u>Example 5A</u>

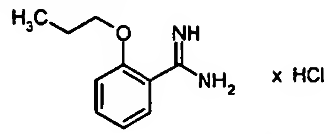
2-Propoxybenzonitrile



75 g (630 ml) of 2-hydroxybenzonitrile are refluxed with 174 g (1.26 mol) of potassium carbonate and 232.2 g (1.89 mol) of ethyl bromide in 1 l of acetone overnight. The solid is filtered off, the solvent is removed under reduced pressure and the residue is distilled under reduced pressure.
b.p.: 89°C (0.7 mbar)
Yield: 95.1 g (93.7%)

Example 6A

2-Propoxybenzamidine hydrochloride

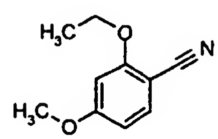


21.41 g (400 mmol) of ammonium chloride are suspended in 400 ml of toluene and cooled to 0-5°C. 200 ml of a 2M solution of triethylaluminium in hexane are added dropwise, and the mixture is stirred at room temperature until the evolution of gas has ceased. After addition of 32.2 g (200 mmol) of 2-propoxybenzonitrile, the reaction mixture is stirred at 80°C (bath) overnight. With ice-cooling, the cooled reaction mixture is added to a suspension of 300 g of silica gel and 2.85 l of ice-cooled chloroform, and the mixture is stirred for 30 minutes. The mixture is filtered off with suction and the filter residue is washed with the same amount of methanol. The solvent is distilled off under reduced pressure, the residue is stirred with 500 ml of a mixture of dichloromethane and methanol (9:1), the solid is filtered off and the mother liquor is concentrated. The residue is stirred with petroleum ether and filtered off with suction. This gives 22.3 g (52%) of product.

^{1}H-NMR (200 MHz, CD_3OD): 1.05 (3H); 1.85 (sex, 2H); 4.1 (A, 2H); 7.0 - 7.2 (m, 2H); 7.5 - 7.65 (m, 2H).

Example 7A

2-Ethoxy-4-methoxybenzonitrile



30.0 g (201 mmol) of 2-hydroxy-4-methoxybenzonitrile are refluxed with 83.4 g of potassium carbonate (603 mmol) and 32.88 g (301 mmol) of bromoethane in 550 ml

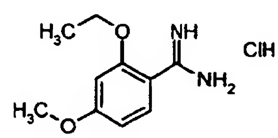
of acetone for 18 hours. After filtration, the solvent is removed under reduced pressure and the residue is purified by silica gel chromatography (cyclohexane:ethyl acetate = 10:1): 35.9 g of an oil

R_f = 0.37 (cyclohexane:ethyl acetate = 3:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.48, t, 3H; 3.85, s, 3H; 4.12, quart., 2H; 6.46, m, 2H; 7.48, d, 1H.

Example 8A

2-Ethoxy-4-methoxybenzamidine hydrochloride



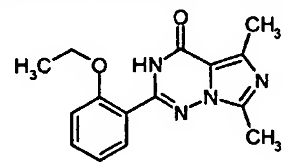
6.98 g (130 mmol) of ammonium chloride are suspended in 150 ml of toluene, and the suspension is cooled to 0°C. 70 ml of a 2M solution of trimethylaluminium in hexane are added dropwise, and the mixture is stirred at room temperature until the evolution of gas has ceased. After addition of 11.56 g (65 mmol) of 2-ethoxy-4-methoxybenzonitrile, the reaction mixture is stirred at 80°C (bath) overnight.

With ice-cooling, the cooled reaction mixture is added to a suspension of 100 g of silica gel and 950 ml of dichloromethane, and the mixture is stirred at room temperature for 30 minutes. The mixture is filtered off with suction and the filter residue is washed with the same amount of methanol. The mother liquor is concentrated, the resulting residue is stirred with a mixture of dichloromethane and methanol (9:1), the solid is filtered off with suction and the mother liquor is concentrated. The residue is stirred with petroleum ether and filtered off with suction. This gives 7.95 g (50%) of a solid.

200 MHz ^{1}H-NMR (DMSO-d6): 1.36, t, 3H; 3.84, s, 3H; 4.15, quart., 2H; 6.71, m, 2H; 7.53, d, 1H, 8.91, s, broad, 3H.

Example 9A

2-(2-Ethoxyphenyl)-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



24.4 g (0.186 mol) of N-acetyl-D,L-alanine are initially charged in 200 ml of absolute tetrahydrofuran, and 45 ml of absolute pyridine and 0.5 g of 4-dimethylaminopyridine are added. The mixture is heated to reflux, and 51.85 g (0.372 mol) of ethyl oxalyl chloride are added dropwise. The mixture is heated under reflux for a further 90 minutes, cooled, poured into ice-water and extracted three times with ethyl acetate. The organic phase is dried over sodium sulphate, concentrated and taken up in 62.5 ml of methanol. 9 g of sodium bicarbonate are added and the mixture is stirred under reflux for 2.5 hours and filtered.

With ice-cooling, 9.54 g (190.65 mmol) of hydrazine hydrate are added dropwise to a solution of 38.26 g (190.65 mmol) of 2-ethoxy-4-methoxybenzamidine hydrochloride in 250 ml of methanol, and the resulting suspension is stirred at room temperature for another 30 minutes. The methanolic solution described above is added to this reaction mixture, and the mixture is stirred at a bath temperature of 70°C for 4 hours. After filtration, the mixture is concentrated, the residue is partitioned between dichloromethane and water, the organic phase is dried over sodium sulphate and the solvent is removed under reduced pressure.

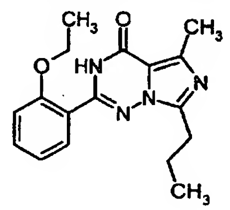
The residue is taken up in 250 ml of 1,2-dichloroethane, 32.1 ml (348 mmol) of phosphorus oxychloride are added dropwise and the mixture is heated under reflux for two hours. The mixture is cooled, concentrated, taken up in a little methylene

chloride and admixed with diethyl ether, and the solid is filtered off with suction. After the silica gel chromatography (methylene chloride/methanol 95:5), the solution is concentrated and the crystalline residue is stirred with diethyl ether.
Yield: 8.1 g (14.9% of theory)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.58, t, 3H; 2.62, s, 3H; 2.68, s, 3H; 4.25, q, 2H; 7.04, d, 1H; 7.12, t, 1H; 7.5, dt, 1H; 8.19, dd, 1H; 10.02, s, 1H.

Example 10A

2-(2-Ethoxy-phenyl)-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



7.16 g (45 mmol) of 2-butyrylamino-propionic acid and 10.67 g of pyridine are dissolved in 45 ml of THF and, after addition of a spatula tip of DMAP, heated to reflux. 12.29 g (90 mmol) of ethyl oxalyl chloride are slowly added dropwise, and the reaction mixture is refluxed for 3 hours. The mixture is poured into ice-water and extracted three times with ethyl acetate and the organic phase is dried over sodium sulphate and concentrated using a rotary evaporator. The residue is taken up in 15 ml of ethanol and refluxed with 2.15 g of sodium bicarbonate for 2.5 hours. The cooled solution is filtered.

With ice-cooling, 2.25 g (45 mmol) of hydrazine hydrate are added dropwise to a solution of 9.03 g (45 mmol) of 2-ethoxybenzamidine hydrochloride in 45 ml of ethanol, and the resulting suspension is stirred at room temperature for another 10 minutes. The ethanolic solution described above is added to this reaction mixture, and the mixture is stirred at a bath temperature of 70°C for 4 hours. After filtration, the mixture is concentrated, the residue is partitioned between dichloromethane and

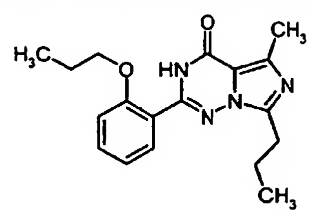
water, the organic phase is dried over sodium sulphate and the solvent is removed under reduced pressure.

This residue is dissolved in 60 ml of 1,2-dichloroethane and, after addition of 7.5 ml of phosphorus oxychloride, refluxed for 2 hours. The mixture is diluted with dichloromethane and neutralized by addition of sodium bicarbonate solution and solid sodium bicarbonate. The organic phase is dried and the solvent is removed under reduced pressure. Chromatography using ethyl acetate and crystallization afford 4.00 g (28%) of a colourless solid, R_f = 0.42 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.56, t, 3H; 1.89, hex, 2H; 2.67, s, 3H; 3.00, t, 2H; 4.26, quart., 2H; 7.05, m, 2H; 7.50, dt, 1H; 8.17, dd, 1H; 10.00, s, 1H.

Example 11A

2-(2-Propoxy-phenyl)-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



7.16 g (45 mmol) of 2-butyrylaminopropionic acid and 10.67 g of pyridine are dissolved in 45 ml of tetrahydrofuran and, after addition of a spatula tip of dimethylaminopyridine, heated to reflux. 12.29 g (90 mmol) of ethyl oxalyl chloride are slowly added dropwise, and the reaction mixture is refluxed for 3 hours. The mixture is poured into ice-water and extracted three times with ethyl acetate, and the organic phase is dried over sodium sulphate and concentrated using a rotary evaporator. The residue is taken up in 15 ml of ethanol and refluxed with 2.15 g of sodium bicarbonate for 2.5 hours. The cooled solution is filtered.

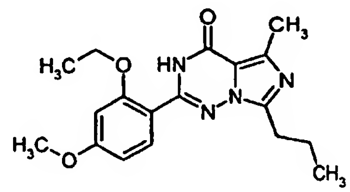
With ice-cooling, 2.25 g (45 mmol) of hydrazine hydrate are added dropwise to a solution of 9.66 g (45 mmol) of 2-propoxybenzamidine hydrochloride in 45 ml of ethanol, and the resulting suspension is stirred at room temperature for another 10 minutes. The ethanolic solution described above is added to this reaction mixture, and the mixture is stirred at a bath temperature of 70°C for 4 hours. After filtration, the mixture is concentrated, the residue is partitioned between dichloromethane and water, the organic phase is dried over sodium sulphate and the solvent is reduced under reduced pressure.

This residue is dissolved in 60 ml of 1,2-dichloroethane and, after addition of 7.5 ml of phosphorus oxychloride, refluxed for 2 hours. The mixture is diluted with dichloromethane and neutralized by addition of sodium bicarbonate solution and solid sodium bicarbonate. The organic phase is dried and the solvent is removed under reduced pressure. Crystallization from ethyl acetate gives 2.85 g (19.1%) of a yellow solid, chromatographic purification of the mother liquor gives a further 1.25 g (8.4%) of the product. R_f = 0.45 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.03, t, 3H; 1.15, t, 3H; 1.92, m, 4H; 2.67, s, 3H; 3.01, t, 2H; 4.17, t., 2H; 7.09, m, 2H; 7.50, dt, 1H; 8.17, dd, 1H; 10.02, s, 1H.

Example 12A

2-(2-Ethoxy-4-methoxyphenyl)-5-methyl-7-propyl-3*H*-imidazo[5,1-*f*][1,2,4]triazin-4-one



5.50 g (34.8 mmol) of 2-butyrylaminopropionic acid and 8.19 g of pyridine are dissolved in 35 ml of tetrahydrofuran and, after addition of a spatula tip of dimethylaminopyridine, heated to reflux. 9.43 g (69 mmol) of ethyl oxalyl chloride are slowly added dropwise, and the reaction mixture is refluxed for 3 hours. The mixture is poured into ice-water and extracted three times with ethyl acetate, and the organic phase is dried over sodium sulphate and concentrated using a rotary evaporator. The residue is taken up in 11 ml of methanol and refluxed with 1.65 g of sodium bicarbonate for 2.5 hours. The cooled solution is filtered.

With ice-cooling, 1.73 g (34.5 mmol) of hydrazine hydrate are added dropwise to a solution of 7.95 g (34.5 mmol) of 2-ethoxy-4-methoxybenzamidine hydrochloride in 35 ml of ethanol, and the resulting suspension is stirred at room temperature for another 30 minutes. The methanolic solution described above is added to this reaction mixture, and the mixture is stirred at a bath temperature of 70°C for 4 hours. After filtration, the mixture is concentrated, the residue is partitioned between dichloromethane and water, the organic phase is dried over sodium sulphate and the solvent is removed under reduced pressure.

This residue is dissolved in 46 ml of 1,2-dichloroethane and, after addition of 5.74 ml of phosphorus oxychloride, refluxed for 2 hours. The mixture is diluted with dichloromethane and neutralized by addition of sodium bicarbonate solution and solid sodium bicarbonate. The organic phase is dried and the solvent is removed

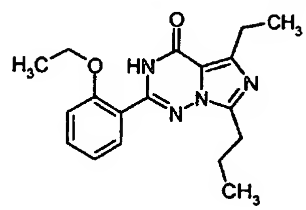
under reduced pressure. Chromatography (dichloromethane:methanol = 50:1) gives 0.31 g (2.5%) of a solid.

R_f = 0.46 (dichloromethane:methanol = 20:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.03, t, 3H; 1.58, t, 3H; 1.88, m, 2H; 2.62, s, 3H; 2.98, t, 2H; 3.89, s, 3H; 4.25, quart., 2H; 6.54, d, 1H, 6.67, dd, 1H; 8.14, d, 1H; 9.54, s, 1H.

Example 13A

2-(2-Ethoxyphenyl)-5-ethyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



29.06 g (167.8 mmol) of 2-butyrylaminobutyric acid and 39.76 g of pyridine are dissolved in 170 ml of tetrahydrofuran and, after addition of a spatula tip of dimethylaminopyridine, heated to reflux. 45.81 g (335.5 mmol) of ethyl oxalyl chloride are slowly added dropwise, and the reaction mixture is refluxed for 3 hours. The mixture is poured into ice-water and extracted three times with ethyl acetate, and the organic phase is dried over sodium sulphate and concentrated using a rotary evaporator. The residue is taken up in 15 ml of methanol, and half of the solution is refluxed with 7.96 g of sodium bicarbonate for 2.5 hours. The cooled solution is filtered.

With ice-cooling, 4.20 g (83.9 mmol) of hydrazine hydrate are added dropwise to a solution of 16.83 g (83.9 mmol) of 2-ethoxybenzamidine hydrochloride in 85 ml of ethanol, and the resulting suspension is stirred at room temperature for another 10 minutes. The methanolic solution described above is added to this reaction mixture, and the mixture is stirred at a bath temperature of 70°C for 4 hours. After filtration,

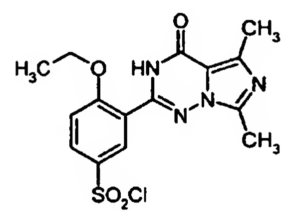
the mixture is concentrated, the residue is partitioned between dichloromethane and water, the organic phase is dried over sodium sulphate and the solvent is removed under reduced pressure.

This residue is dissolved in 112 ml of 1,2-dichloroethane and, after addition of 14 ml of phosphorus oxychloride, refluxed for 2 hours. The mixture is diluted with dichloromethane and neutralized by addition of sodium bicarbonate solution and solid sodium bicarbonate. The organic phase is dried and the solvent is removed under reduced pressure. Chromatography (dichloromethane:methanol = 50:1) gives 3.69 g (12.4%) of a colourless solid, R_f = 0.46 (dichloromethane:methanol = 20:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.32, t, 3H; 1.57, t, 3H; 1.94, m, 8H; 3.03, quart., 2H; 3.64, quin., 1H; 4.27, quart., 2H; 7.06, d, 1H; 7.12, t, 1H; 7.50, dt, 1H, 8.16, dd, 1H; 9.91, s, 1H.

Example 14A

4-Ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride



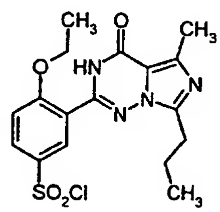
7.25 g (25.5 mmol) of 2-(2-ethoxyphenyl)-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]-triazin-4-one are initially charged, and 26.74 g (0.23 mol) of chlorosulphonic acid are added with ice-cooling. The mixture is stirred at room temperature overnight and poured into ice-water, and the crystals are filtered off with suction and dried in a vacuum desiccator.

Yield: 9.5 g (97% of theory)

200 MHz ^{1}H-NMR (d^6-DMSO): 1.32, t, 3H; 2.63, s, 3H; 2.73, s, 3H; 4.13, q, 2H; 7.15, d, 1H; 7.77, m, 2H; 12.5, s, 1H;

Example 15A

4-Ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride

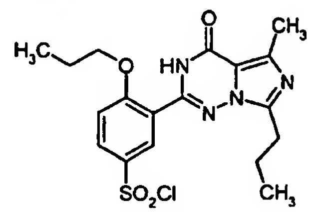


At 0°C, 2.00 g (6.4 mmol) of 2-(2-ethoxy-phenyl)-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are slowly added to 3.83 ml of chlorosulphonic acid. At room temperature, the reaction mixture is stirred overnight, and then poured into ice-water and extracted with dichloromethane. This gives 2.40 g (91%) of a colourless foam.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.03, t, 3H; 1.61, t, 2H; 1.92, hex, 2H; 2.67, s, 3H; 3.10, t, 2H; 4.42, quart., 2H; 7.27, t, 1H; 8.20, dd, 1H; 8.67, d, 1H; 10.18, s, 1H.

Example 16A

4-Propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride



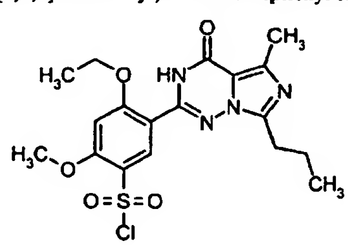
At 0°C, 2.80 g (8.6 mmol) of 2-(2-propoxy-phenyl)-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are added slowly to 5.13 ml of chlorosulphonic acid. The reaction mixture is stirred at room temperature overnight and then poured into ice-water and extracted with dichloromethane. This gives 3.50 g (96%) of a colourless foam.

R_f = 0.49 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.03, 2t, 6H; 1.95, m, 4H; 2.81, s, 3H; 3.22, t, 2H; 4.11, t., 2H; 7.09, m, 1H; 8.06, dd, 1H; 8.21 m, 1H; 12.0, s, 1H.

Example 17A

4-Ethoxy-2-methoxy-5-(5-methyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride



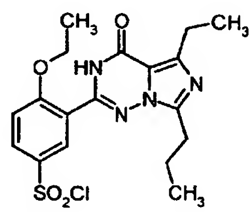
At 0°C, 0.31 g (0.9 mmol) of 2-(2-ethoxy-4-methoxyphenyl)-5-methyl-7-propyl-3*H*-imidazo[5,1-*f*]-[1,2,4]triazin-4-one are added slowly to 0.54 ml of chlorosulphonic acid. The reaction mixture is stirred at room temperature overnight and then poured into ice-water and extracted with dichloromethane. This gives 0.355 g (89%) of a colourless foam.

R_f = 0.50 (dichloromethane/methanol = 20:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.05, t, 3H; 1.66, t, 3H; 1.95, m, 2H; 2.61, s, 3H, 3.11, t, 2H; 4.15, s, 3H; 4.40, quart., 2H; 6.65, s, 1H, 8.72, s, 1H; 9.75, s, 1H.

Example 18A

4-Ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzene-sulphonyl chloride

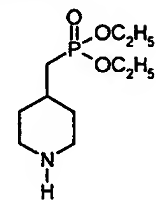


At 0°C, 1.70 g (5.21 mmol) of 2-(2-ethoxy-phenyl)-5-ethyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are added slowly to 3.12 ml of chlorosulphonic acid. The reaction mixture is stirred at room temperature overnight and then poured into ice-water and extracted with dichloromethane. This gives 2.10 g (94%) of a colourless foam.

400 MHz ^{1}H-NMR ($CDCl_3$): 1.03, t, 3H; 1.35, t, 3H; 1.62, t, 3H; 1.92, sex., 2H; 3.07, quart., 2H; 3.12, t, 2H; 4.42, quart., 2H; 7.38, d, 1H; 8.19, dd, 1H; 8.70, d, 1H; 10.08, s, broad, 1H.

Example 19A

Diethyl (4-piperidinylmethyl)-phosphonate



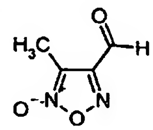
2.11 g (528 mmol) of 60% strength sodium hydride are initially charged in 50 ml of absolute tetrahydrofuran, and 15.7 g (52.8 mmol) of diethyl methanediphosphonate are added dropwise. The mixture is stirred at room temperature for another 30 minutes, and 10.1 g (52.8 mmol) of 1-benzyl-4-piperidone are then added. The mixture is stirred for one hour at room temperature and for one hour under reflux, concentrated, admixed with water and extracted three times with dichloromethane, and the organic phases are dried over sodium sulphate and concentrated. The residue is hydrogenated in 50 ml of ethanol over 1.7 g of 10% palladium-carbon at room temperature and 3 bar. The catalyst is filtered off with suction and the filtrate is concentrated.

Yield: 12.5 g (100% of theory)

400 MHz, ^{1}H-NMR ($CDCl_3$): 1.13, m, 2H; 1.32, t, 6H; 1.69, dd, 2H; 1.74 - 1.95, m, 4H; 2.62, dt, 2H; 3.05, m, 2H; 4.1, m, 4H.

Example 20A

5-Methyl-4-furoxanecarbaldehyde

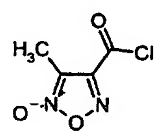


40 g (571 mmol) of crotonaldehyde are dissolved in 80 ml of acetic acid and, at 0°C, admixed dropwise with a solution of 137 g (1.99 mol) of sodium nitrite in 300 ml of water. The mixture is stirred at room temperature for 2 hours, diluted with 800 ml of water and extracted 3 times with dichloromethane. The organic phase is dried, and chromatography (cyclohexane/ethyl acetate) gives 13.8 g (18.9%) of 5-methyl-4-furoxanecarbaldehyde.

200 MHz ^{1}H-NMR ($CDCl_3$):2.39, s, 3H; 10.10, s, 1H.

Example 21A

5-Methyl-4-furoxanecarbonyl chloride



13.5 g (105 mmol) of 5-methyl-4-furoxanecarbaldehyde are dissolved in 200 ml of acetone and, at 0°C, admixed dropwise with a solution of 16.86 g (168 mmol) of chromium trioxide in 120 ml of a 2.2M sulphuric acid. The mixture is stirred at 10-15°C for 2 hours and then at room temperature overnight. With cooling, 100 ml of isopropanol are added dropwise and, after 30 minutes, the solvent is removed under reduced pressure. The aqueous phase is extracted 3 times with ether, the organic phase is dried over magnesium sulphate and the solvent is removed under reduced pressure. The residue is dissolved in 1M sodium hydroxide solution and the solution is extracted 3 times with ether. The aqueous phase is acidified and extracted 3 times

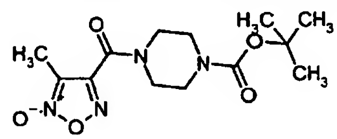
with ether. The organic phase is dried and the solvent is removed under reduced pressure. The residue is stirred with petroleum ether and filtered off with suction.

6.92 g of the residue are refluxed with 10 ml of thionyl chloride in 20 ml of dichloromethane for 6 hours. The mixture is diluted with toluene, filtered and concentrated using a rotary evaporator. The residue is once more taken up in dichloromethane, admixed with 10 ml of thionyl chloride and refluxed for 48 hours. The solvent is removed under reduced pressure and the residue is distilled under reduced pressure. This gives 2.00 g (25%) of colourless crystals.

200 MHz ^{1}H-NMR ($CDCl_3$): 2.41, s.

Example 22A

1-(5-Methyl-4-furoxanecarbonyl)-4-tert-butyl-oxycarbonyl-piperazine

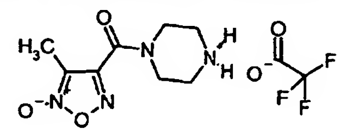


2.75 g (14.7 mmol) of Boc-piperazine and 1.49 g of triethylamine are dissolved in 20 ml of dichloromethane and, at 0°C, admixed a little at a time with 2.00 g (12.3 mmol) of 5-methyl-4-furoxanecarbonyl chloride. The mixture is stirred for 30 minutes at 0°C and for 2 hours at room temperature, diluted with dichloromethane and washed with water. The solvent is removed under reduced pressure and the residue is purified by chromatography (cyclohexane/ethyl acetate). This gives 3.33 g (87%) of 1-(5-methyl-4-furoxanecarbonyl)-4-tert-butyl-oxycarbonyl-piperazine.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.50, s, 9H; 2.30, s, 3H; 3.55, m, 4H; 3.78, m, 2H; 3.87, m, 2H.

Example 23A

1-(5-Methyl-4-furoxanecarbonyl)-piperazine trifluoroacetate



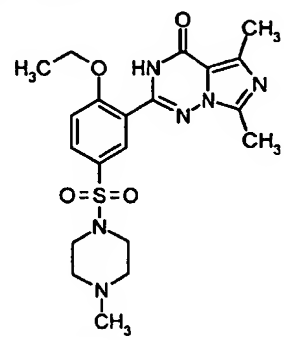
3.12 g (10 mmol) of 1-(5-methyl-4-furoxanecarbonyl)-4-tert-butyl-oxycarbonyl-piperazine are dissolved in 20 ml of dichloromethane and, at 0°C, admixed with 2 ml of trifluoroacetic acid. The mixture is allowed to warm to room temperature and stirred for 72 hours. After addition of 10 ml of ether, the precipitate is filtered off with suction and dried. This gives 2.47 g (83%) of 1-(5-methyl-4-furoxanecarbonyl)-piperazine trifluoroacetate.

200 MHz ^{1}H-NMR (DMSO-d_6): 2.18, s, 3H; 3.18, m, 2H; 3.25, m, 2H; 3.83, m, 2H; 3.90, m, 2H; 8.89, s, broad, 2H.

Preparation examples

Example 1

2-[2-Ethoxy-5-(4-methyl-piperazine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f]-[1,2,4]triazin-4-one



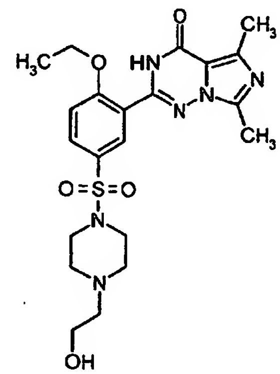
0.1 g (0.26 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo-[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride are dissolved in 10 ml of dichloromethane and cooled to 0°C. After addition of a spatula tip of DMAP, 80 mg (0.784 mmol) of N-methylpiperazine are added and the reaction mixture is stirred at room temperature overnight. The mixture is diluted with dichloromethane, the organic phase is washed with ammonium chloride solution and dried over sodium sulphate and the solvent is removed under reduced pressure. The residue is chromatographed over silica gel (dichloromethane/methanol 9:1).

Yield: 40 mg (34.5% of theory)

Mass spectrum: 447 (M+H); 284; 256; 224.

Example 2

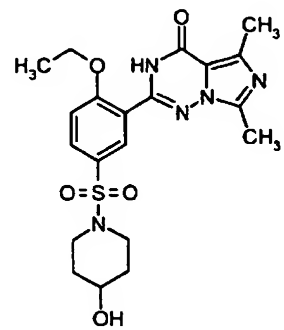
2-[2-Ethoxy-5-(4-hydroxyethylpiperazine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f]-[1,2,4]triazin-4-one



By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 100 mg (0.784 mmol) of 4-hydroxypiperazine, 45 mg (36.1% of theory) of 2-[2-ethoxy-5-(4-hydroxy-ethylpiperazine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f]-[1,2,4]triazin-4-one are obtained.
Mass spectrum: 477 (M+H); 284; 256; 239.

<u>**Example 3**</u>

2-[2-Ethoxy-5-(4-hydroxypiperidine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f]-[1,2,4]triazin-4-one

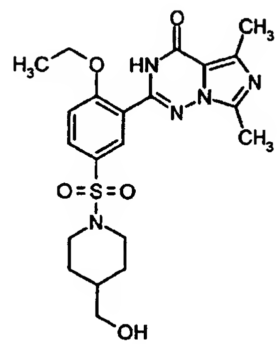


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 80 mg (0.784 mmol) of 4-hydroxypiperidine, 35 mg (29.8% of theory) of 2-[2-ethoxy-5-(4-hydroxy-piperidine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f]-[1,2,4]triazin-4-one are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.61, t, 3H; 1.69, m, 2H; 1.94, m, 2H; 2.67, s, 3H; 2.70, s, 3H; 3.02, m, 2H; 3.30, m, 2H; 3.84, m, 1H; 4.37, q, 2H; 7.18, d, 1H; 7.90, dd, 1H; 8.52, d, 1H; 9.73, s, 1H.

Example 4

2-[2-Ethoxy-5-(4-hydroxymethylpiperidine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

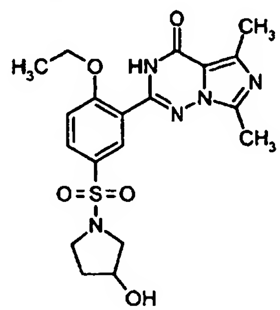


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 90 mg (0.784 mmol) of 4-hydroxymethylpiperidine, 22 mg (18% of theory) of 2-[2-ethoxy-5-(4-hydroxy-methylpiperidine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.38, dt, 2H; 1.62, t, 3H; 1.82, dd, 2H; 2.35, dt, 2H; 2.78, s, 3H; 2.84, s, 3H; 3.5, d, 2H; 3.87, d, 2H; 4.39, q, 2H; 7.21, d, 1H; 7.95, dd, 1H; 8.51, d, 1H; 10.03, bs, 1H.

Example 5

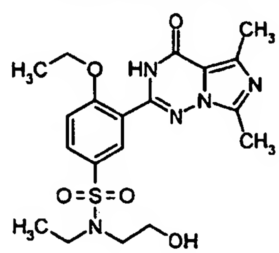
2-[2-Ethoxy-5-(3-hydroxypyrrolidine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f]-[1,2,4]triazin-4-one



By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 70 mg (0.784 mmol) of 3-hydroxypyrrolidine, 13 mg (11.1% of theory) of 2-[2-ethoxy-5-(3-hydroxy-pyrrolidine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo-[5,1-f][1,2,4]triazin-4-one are obtained.
Mass spectrum: 434 (M+H)

Example 6

4-Ethoxy-N-ethyl-N-(2-hydroxyethyl)-3-(5,7-dimethyl-4-oxo-3,4-dihydro-imidazo[5,1-f]-[1,2,4]triazin-2-yl)benzenesulphonamide

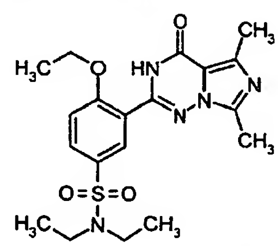


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 70 mg (0.784 mmol) of 2-(ethylamino)-ethanol, 23 mg (20.1% of theory) of 4-ethoxy-N-ethyl-N-(2-hydroxyethyl)-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo-[5,1-f][1,2,4]triazin-2-yl)-benzene-sulphonamide are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.2, t, 3H; 1.6, t, 3H; 2.17, bs, 1H; 2.69, s, 3H; 2.75, s, 3H; 3.33, m, 4H; 3.8, t, 2H; 4.36, q, 2H; 7.18, d, 1H; 7.99, dd, 1H; 8.6, d, 1H; 9.84, bs,1H.

Example 7

N,N-Diethyl-4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonamide

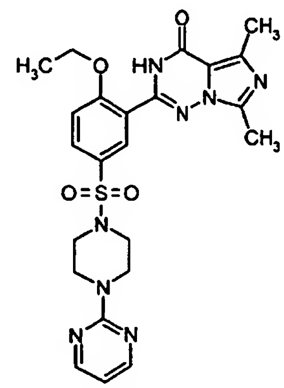


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzene-sulphonyl chloride and 60 mg (0.784 mmol) of diethylamine, 21 mg (18.6% of theory) of N,N-diethyl-4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonamide are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.18, t, 6H; 1.61, t, 3H; 2.68, s, 3H; 2.72, s, 3H; 3.29, q, 4H; 4.35, q, 2H; 7.15, d, 1H; 7.95, dd, 1H; 8.58, d, 1H; 9.8, bs, 1H.

Example 8

2-[2-Ethoxy-5-(4-(2-pyrimidinyl)-piperazine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo-[5,1-f][1,2,4]triazin-4-one

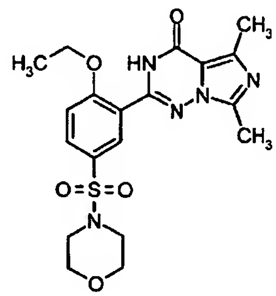


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 130 mg (0.784 mmol) of 1-(2-pyrimidinyl)-piperazine, 38 mg (28.2% of theory) of 2-[2-ethoxy-5-(4-(2-pyrimidinyl)-piperazine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo-[5,1-f][1,2,4]triazin-4-one are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.6, t, 3H; 2.68, s, 3H; 2.72, s, 3H; 3.12, t, 4H; 3.96, t, 4H; 4.34, q, 2H; 6.5, t, 1H; 7.18, d, 1H; 7.9, dd, 1H; 8.28, d, 2H; 8.51, d, 1H; 9.7, bs, 1H.

Example 9

2-[2-Ethoxy-5-(morpholine-4-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

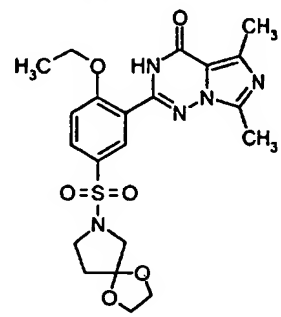


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 70 mg (0.784 mmol) of morpholine, 28 mg (24.2% of theory) of 2-[2-ethoxy-5-(morpholine-4-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.53, t, 3H; 2.69, s, 3H; 2.72, s, 3H; 3.06, t, 4H; 3.77, t, 4H; 4.39, q, 2H; 7.2, d, 1H; 7.91, dd, 1H; 8.51, d, 1H; 9.78, bs, 1H.

Example 10

2-[2-Ethoxy-5-(1,4-dioxa-6-azaspiro[4.4]nonane-6-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

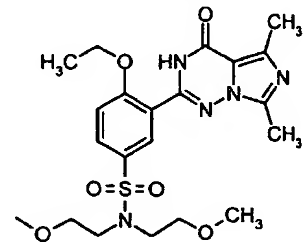


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 100 mg (0.784 mmol) of 1,4-dioxa-6-azaspiro[4.4]nonane, 45 mg (35.3% of theory) of 2-[2-ethoxy-5-(1,4-dioxa-6-azaspiro[4.4]nonane-6-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]-triazin-4-one.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.58, t, 3H; 2.02, t, 2H; 2.61, s, 3H; 2.65, s, 3H; 3.32, s, 2H; 3.41, t, 2H; 3.88, m, 4H; 4.34, q, 2H; 7.17, d, 1H; 7.92, dd, 1H; 8.51, d, 1H; 9.92, bs, 1H.

Example 11

N,N-Bis-(2-methoxyethyl)-4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydro-imidazo[5,1-f]-[1,2,4]triazin-2-yl)-benzenesulphonamide

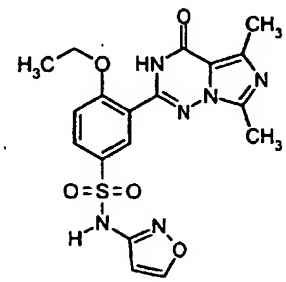


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzene-sulphonyl chloride and 100 mg (0,784 mmol) of bis-(2-methoxyethyl)-amine, 37 mg (27.5% of theory) of N,N-bis-(2-methoxy-ethyl)-4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonamide are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.58, t, 3H; 2.61, s, 3H; 2.64, s, 3H; 3.3, s, 6H; 3.46, t, 4H; 3.56, t, 4H; 4.32, q, 2H; 7.12, d, 1H; 7.95, dd, 1H; 8.51, d, 1H; 9.9, bs, 1H

Example 12

N-(3-Isoxazolyl)-4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonamide

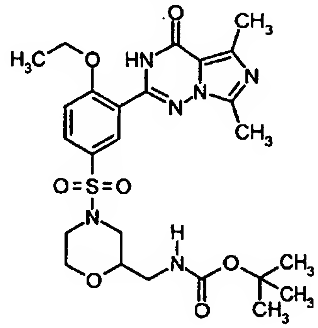


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 70 mg (0.784 mmol) of 3-aminoisoxazol, 20 mg (17.2% of theory) N-(3-isoxazolyl)-4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonamide are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1,6, t, 3H; 2.73, s, 3H; 2.81, s, 3H; 4.35, q, 2H; 6.6, d, 1H; 7.14, d, 1H; 8.05, dd, 1H; 8.27, d, 1H; 8.63, d, 1H; 9.61, bs, 1H.

Example 13

2-[2-Ethoxy-5-(2-t-butoxycarbonylaminomethylmorpholine-4-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

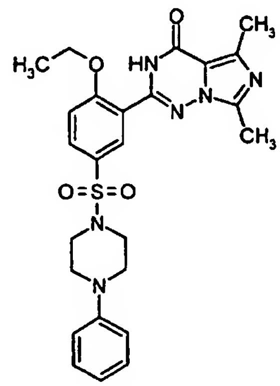


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 170 mg (0.784 mmol) of 2-t-butoxycarbonyl-aminomethylmorpholine, 64 mg (42.2 % of theory) of 2-[2-ethoxy-5-(2-t-butoxycarbonylaminomethylmorpholine-4-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

Mass spectrum: 563 (M+H)

Example 14

2-[2-Ethoxy-5-(4-phenylpiperazine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f]-[1,2,4]triazin-4-one

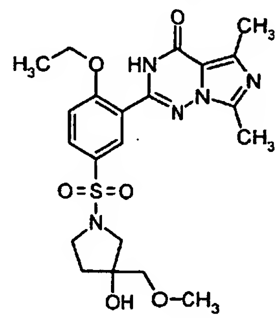


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 130 mg (0.784 mmol) of 1-phenylpiperazine, 38 mg (28,3 % of theory) of 2-[2-ethoxy-5-(4-phenylpiperazine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$):1.62, t, 3H; 2.72, s, 3H; 2.77, s, 3H; 3.25, m, 8H; 4.38, q, 2H; 6.92, m, 2H; 7.02, d, 1H; 7.18-7.37, m, 3H; 7.94, dd, 1H; 8.55, m, 1H; 9.79, bs, 1H.

Example 15

2-[2-Ethoxy-5-(3-hydroxy-3-methoxymethylpyrrolidine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

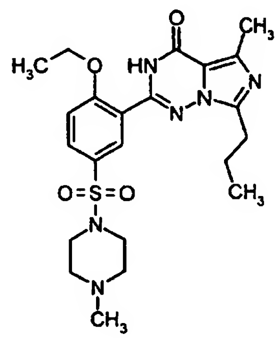


By the same method, starting with 100 mg (0.261 mmol) of 4-ethoxy-3-(5,7-dimethyl-4-oxo-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 100 mg (0.784 mmol) of 3-hydroxy-3-methoxymethylpyrrolidine, 30 mg (23.5% of theory) of 2-[2-ethoxy-5-(3-hydroxy-3-methoxymethylpyrrolidine-1-sulphonyl)-phenyl]-5,7-dimethyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

Mass spectrum: 478 (M+H)

Example 16

2-[2-Ethoxy-5-(4-methyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

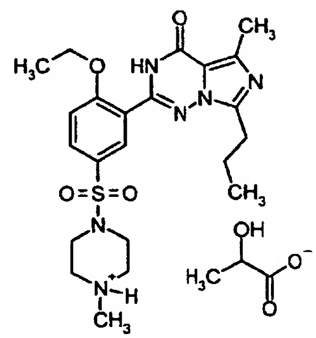


1.23 g (3 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride are dissolved in 40 ml of dichloromethane and cooled to 0°C. After addition of a spatula tip of DMAP, 0.90 g (9.00 mmol) of N-methylpiperazine are added, and the reaction mixture is stirred at room temperature overnight. The mixture is diluted with dichloromethane, the organic phase is washed twice with water and dried over sodium sulphate and the solvent is removed under reduced pressure. Crystallization from ether gives 1.25 g (88%) of a colourless solid.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.59, t, 3H; 1.88, hex, 2H; 2.29, s, 3H; 2.51, m, 4H; 2.63, s, 3H; 3.00, t, 2H; 3.08, m, 4H; 4.33, quart., 2H, 7.17, d, ,1H; 7.88, dd, 1H; 8.44, d, 1H; 9.75, s, 1H.

Example 17

2-[2-Ethoxy-5-(4-methyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one lactate

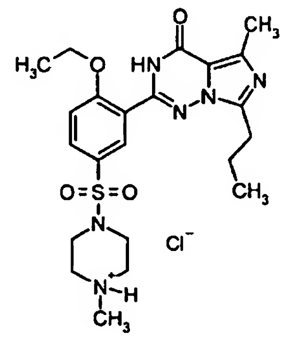


100 mg (0.211 mmol) of 2-[2-ethoxy-5-(4-methyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are suspended in 5 ml of ether and admixed with 20 mg of an 85% strength solution of lactic acid in water. The mixture is stirred at room temperature for 10 minutes and evaporated to dryness. The residue is titrated with ether and filtered off with suction. This gives 110 mg (92%) of 2-[2-ethoxy-5-(4-methyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one lactate.

200 MHz ^{1}H-NMR (DMSO-d_6): 0.92, t, 3H; 1.22, d, 3H; 1.31, t, 3H; 1.74, m, 1H; 2.15, s, 3H; 2.38, m, 4H; 2.81, t, 2H; 2.91, m, 4H; 4.05, quart., 1H; 4.21, quart., 2H; 7.40, d, 1H; 7.85, m, 2H; 11.71, s, broad, 1H.

Example 18

2-[2-Ethoxy-5-(4-methyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one hydrochloride

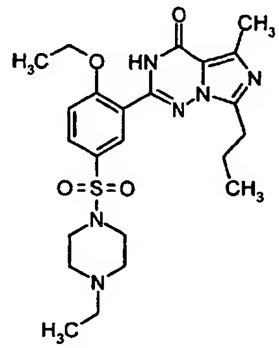


100 mg (0.211 mmol) of 2-[2-ethoxy-5-(4-methyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are suspended in 5 ml of diethyl ether, admixed with 0.23 ml of a 1M solution of HCl in ether and stirred at room temperature for 15 minutes. The solvent is removed under reduced pressure. This gives 107 mg (97%) of 2-[2-ethoxy-5-(4-methyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one hydrochloride.

200 MHz ^{1}H-NMR (DMSO-d_6): 0.93, t, 3H; 1.35, t, 3H; 1.75, sex., 2H; 2.72, s, 3H; 2.86, m, 4H; 3.15, m, 2H; 3.45, m, 2H; 3.81, m, 2H; 4.25, quart., 2H; 7.45, d, 1H; 7.95, m, 2H; 11.39, s, 1H; 11.90, s, 1H.

Example 19

2-[2-Ethoxy-5-(4-ethyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

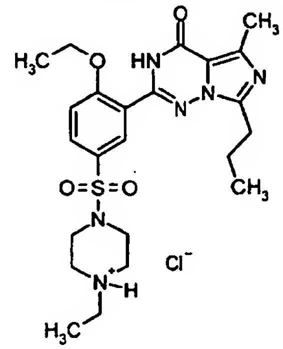


470 mg (1.14 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride are dissolved in 20 ml of dichloromethane and cooled to 0°C. 390 mg (3.42 mmol) of N-ethylpiperazine are added, and the reaction mixture is stirred at room temperature overnight. The mixture is diluted with dichloromethane, the organic phase is washed twice with water and dried over sodium sulphate and the solvent is removed under reduced pressure. Crystallization from ether gives 370 mg (66%) of a colourless solid.

400 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.59, t, 3H; 1.88, hex, 2H; 2.42, quart., 2H; 2.56, m, 4H; 2.63, s, 3H; 3.00, t, 2H; 3.10, m, 4H; 4.33, quart., 2H, 7.17, d, ,1H; 7.88, dd, 1H; 8.44, d, 1H; 9.75, s, 1H.

Example 20

2-[2-Ethoxy-5-(4-ethyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one hydrochloride

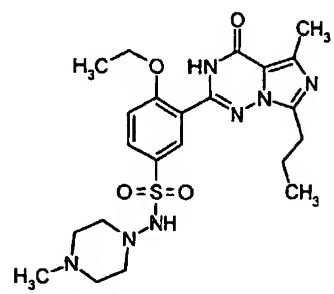


0.35 g (0.712 mmol) of 2-[2-ethoxy-5-(4-ethyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are suspended in 8 ml of ether and dichloromethane is added until a homogeneous solution is formed. 0.8 ml of a 1M solution of HCl in ether is added, and the mixture is stirred at room temperature for 20 minutes and filtered off with suction. This gives 372 mg (99%) of 2-[2-ethoxy-5-(4-ethyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one hydrochloride.

200 MHz ^{1}H-NMR (DMSO-d_6): 0.96, t, 3H; 1.22, t, 3H; 1.36, t, 3H; 1.82, sex., 2H; 2.61, s, 3H; 2.88, m, 2H; 3.08, m, 6H; 3.50, m, 2H; 3.70, m, 2H; 4.25, quart., 2H; 7.48, d, 1H; 7.95, m, 2H; 11.42, s, 1H; 12.45, s, 1H.

Example 21

2-[2-Ethoxy-5-(4-methyl-1-amino-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

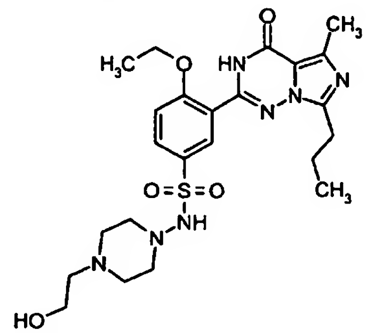


By the same method, starting with 0.04 g (0.097 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 0.03 g (0.29 mmol) of 1-amino-4-methylpiperazine, 40 mg (83%) of 2-[2-ethoxy-5-(4-methyl-1-amino-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.09 (dichloromethane/methanol = 19:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.59, t, 3H; 1.90, sex., 2H; 2.22, s, 3H; 2.40, m, 4H; 2.62, s, 3H; 2.71, m, 4H; 3.00, m, 2H; 4.32, quart., 2H; 7.14, d, 1H; 8.05, dd, 1H; 8.60, d, 1H.

Example 22

2-[2-Ethoxy-5-(4-hydroxyethyl-1-amino-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

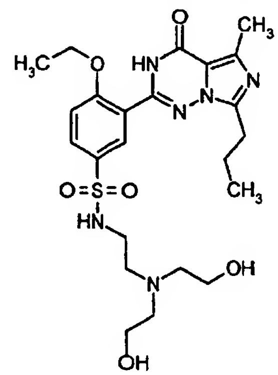


By the same method, starting with 0.04 g (0.097 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 0.04 g (0.29 mmol) of 1-amino-4-hydroxyethylpiperazine, 46 mg (91%) of 2-[2-ethoxy-5-(4-hydroxyethyl-1-amino-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.08 (dichloromethane/methanol = 19:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.59, t, 3H; 1.90, sex., 2H; 2.49, m, 6H; 2.62, s, 3H; 2.71, m, 4H; 3.00, t, 2H; 3.55, t, 2H; 4.31, quart., 2H; 7.14, d, 1H; 8.05, dd, 1H; 8.60, d, 1H.

Example 23

N,N-Bishydroxyethylaminoethyl-4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)benzenesulphonamide

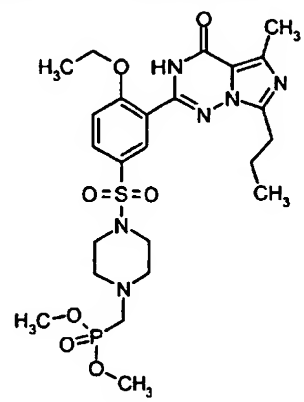


By the same method, starting with 0.04 g (0.097 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 0.043 g (0.29 mmol) of N,N-bishydroxyethylaminoethylamine, 46 mg (91%) of N,N-bishydroxyethylaminoethyl-4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)benzenesulphonamide are obtained.
R_f=0.08 (dichloromethane/methanol=19:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.53, t, 3H; 1.70, m, 2H; 1.86, sex., 2H; 2.9, m, 9H; 2.95, t, 2H; 3.09, t, 2H; 3.65, t, 4H; 4.28, quart., 2H; 7.14, d, 1H; 7.95, dd, 1H; 8.35, d, 1H.

Example 24

2-[2-Ethoxy-5-(4-dimethoxyphosphorylmethyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



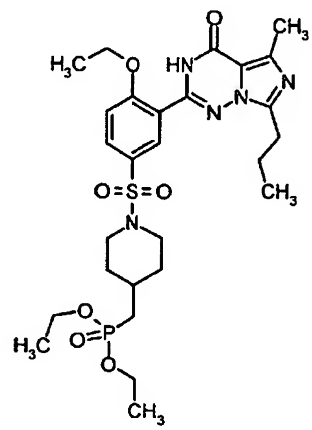
By the same method, starting with 0.4 g (0.97 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride, 390 mg of triethylamine and 0.86 g (2.99 mmol) of 4-dimethoxyphosphorylmethyl-piperazine trifluoroacetate, 321 mg (53%) of 2-[2-ethoxy-5-(4-dimethoxyphosphoryl-methyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

R_f = 0.4 (dichloromethane/methanol = 20:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.60, t, 3H; 1.88, sex., 2H; 2.62, s, 3H; 2.75, m, 4H; 3.02, t, 2H; 3.11, m, 4H; 3.70, s, 3H; 3.75, s, 3H; 4.35, quart., 2H; 5.30, s, 2H; 7.18, d, 1H; 7.88, dd, 1H; 8.45, d, 1H; 9.71, s, 1H.

Example 25

2-[2-Ethoxy-5-(4-diethoxyphosphorylmethyl-piperidine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

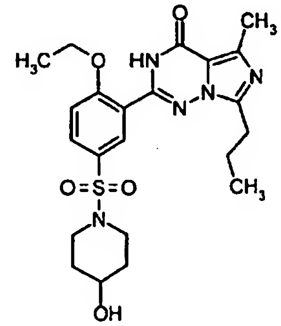


By the same method, starting with 0.4 g (0.97 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 0.86 g (3.7 mmol) of 4-diethoxyphosphorylmethyl-piperidine, 366 mg (49%) of 2-[2-ethoxy-5-(4-diethoxyphosphorylmethyl-piperidine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.4 (dichloromethane/methanol = 20:1)

200 MHz ^{1}H-NMR (DMSO-d_6): 0.92, t, 3H; 1.20, t, 6H; 1.35, t, 3H; 1.75, m, 7H; 2.25, m, 2H; 2.82, t, 2H; 3.61, d, 2H; 3.95, quin., 4H; 4.21, quart., 2H; 7.38, d, 1H; 7.87, m, 2H; 11.70, s, 1H.

Example 26

2-[2-Ethoxy-5-(4-hydroxy-piperidine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

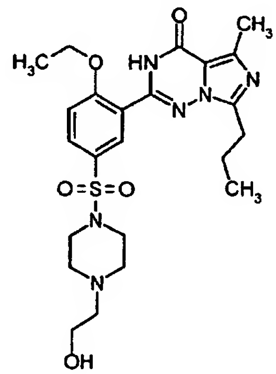


By the same method, starting with 531 mg (1.29 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 393 mg (3.88 mmol) of 4-hydroxypiperidine, 400 mg (64%) of 2-[2-ethoxy-5-(4-hydroxy-piperidine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

200 MHz ^{1}H-NMR (DMSO-d6): 0.941, t, 3H; 1.32, t, 3H; 1.45, m, 2H; 1.71, m, 4H; 2.48, s, 3H; 2.82, m, 4H; 3.11,m, 2H; 3.55, m, 1H; 4.20, quart., 2H; 4.72, d, 1H, 7.39, d,1H; 7.87, m, 2H; 11.70, s, 1H.

Example 27

2-{2-Ethoxy-5-[4-(2-hydroxy-ethyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

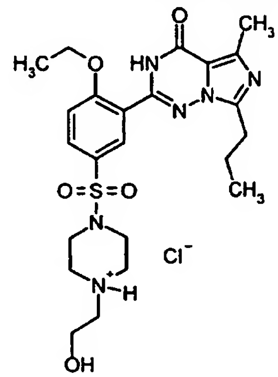


By the same method, starting with 411 mg (1 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 391 mg (3 mmol) of 4-hydroxyethylpiperazine, 380 mg (75%) of 2-{2-ethoxy-5-[4-(2-hydroxy-ethyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.198 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$):1.02, t, 3H; 1.61, t, 3H; 1.87, hex., 3H; 2.60, m, 7H; 3.00, t, 2H; 3.10, m, 4H; 3.60, t, 2H; 4.36, quart., 2H; 7.18, d, 1H, 7.89, dd, 1H, 8.47, d, 1H, 9.71, s, 1H.

Example 28

2-{2-Ethoxy-5-[4-(2-hydroxy-ethyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one hydrochloride

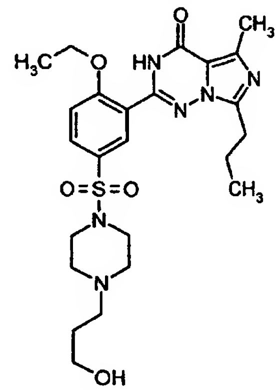


200 mg (0.39 mmol) of 2-{2-ethoxy-5-[4-(2-hydroxy-ethyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are suspended in ether, admixed with 2 ml of a 1M solution of HCl in ether and stirred at room temperature for 20 minutes. The solvent is removed, giving 209 mg (100%) of 2-{2-ethoxy-5-[4-(2-hydroxy-ethyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one hydrochloride.

200 MHz ^{1}H-NMR (DMSO-d6): 0.96, t, 3H; 1.35, t, 3H; 1.70, sex., 2H; 2.59, s, 3H; 2.85, t, 2H; 2.99, t, 2H; 3.18, m, 4H; 3.59, d, 2H; 3.75, m, 4H; 4.25, quart., 2H; 7.49, d, 1H; 7.95, m, 2H; 10.62, s, 1H; 12.31, s, 1H.

Example 29

2-{2-Ethoxy-5-[4-(3-hydroxy-propyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



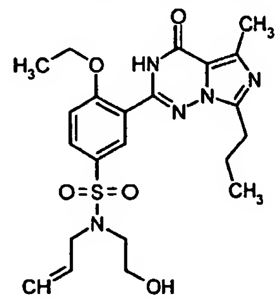
By the same method, starting with 150 mg (0.37 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 158 mg (1.09 mmol) of 4-(3-hydroxypropyl)-piperazine, 167 mg (83%) of 2-{2-ethoxy-5-[4-(3-hydroxy-propyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

R_f = 0.52 (dichloromethane/methanol = 10:1)

200 MHz ^{1}H-NMR ($CDCl_3$):1.02, t, 3H; 1.61, t, 3H; 1.70, m, 5; 2.62 m, 8H; 3.00, t, 2H; 3.10, m, 4H; 3.72, t, 2H; 4.36, quart., 2H; 7.18, d, 1H, 7.89, dd, 1H, 8.47, d, 1H, 9.71, s, 1H.

Example 30

N-Allyl-4-ethoxy-N-(2-hydroxy-ethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)benzenesulphonamide

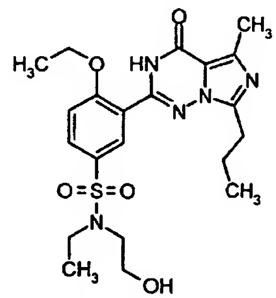


By the same method, starting with 420 mg (1.02 mmol) (1 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 300 mg (3 mmol) of allylhydroxyethylamine, 400 mg (82%) of N-allyl-4-ethoxy-N-(2-hydroxy-ethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)benzenesulphonamide are obtained.
R_f = 0.345 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$):1.02, t, 3H; 1.61, t, 3H; 1.90, m, 2H; 2.22, s, broad, 1H; 2.62, s, 3H; 2.99, t, 2H; 3.31, t, 2H; 3.78, t, 2H; 3.92, d, 2H; 4.37, quart., 2H; 5.23, m, 2H; 5.71, m, 1H; 7.15, d, 1H; 7.98, dd, 1H; 8.56, d, 1H; 9.66, s, 1H.

Example 31

N-Ethyl-4-ethoxy-N-(2-hydroxy-ethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)benzenesulphonamide

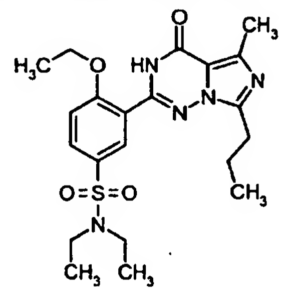


By the same method, starting with 411 mg (1.0 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 267 mg (3 mmol) of ethylhydroxyethylamine, 325 mg (70%) of N-ethyl-4-ethoxy-N-(2-hydroxy-ethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)benzenesulphonamide are obtained.
R_f = 0.29 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$):1.02, t, 3H; 1.20, t, 3H; 1.61, t, 3H; 1.88, sex., 2H; 2.30, s, broad, 1H; 2.62, s, 3H; 2.99, t, 2H; 3.32, m, 4H; 3.78, t, 2H; 3.80, m, 2H; 4.37, quart., 2H; 7.15, d, 1H; 7.98, dd, 1H; 8.56, d, 1H; 9.70, s, 1H.

Example 32

N,N-Diethyl-4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)benzenesulphonamide



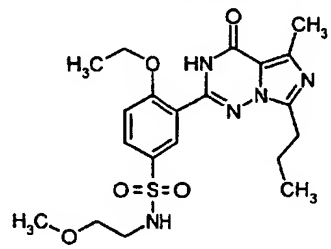
By the same method, starting with 400 mg (0.97 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 210 mg (2.92 mmol) of diethylamine, 398 mg (89%) of N,N-diethyl-4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)benzenesulphonamide are obtained.

R_f = 0.49 (dichloromethane/methanol = 20:1)

200 MHz ^{1}H-NMR ($CDCl_3$):1.02, t, 3H; 1.20, t, 6H; 1.49, t, 1.61, t, 3H; 1.88, sex., 2H; 2.30, s, broad, 1H; 2.62, s, 3H; 2.99, t, 2H; 3.32, m, 4H; 3.78, t, 2H; 3.80, m, 2H; 4.37, quart., 2H; 7.15, d, 1H; 7.98, dd, 1H; 8.56, d, 1H; 9.70, s, 1H.

Example 33

N-(2-Methoxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-benzenesulphonamide



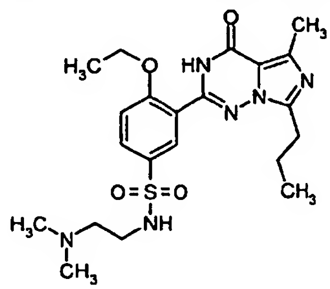
By the same method, starting with 1.23 g (3 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 680 mg (9 mmol) of 2-methoxyethylamine, 900 mg (67%) of N-(2-methoxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-benzenesulphonamide are obtained.

R_f = 0.25 (dichloromethane/methanol = 95:5)

400 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H, 1.58, t, 3H; 1.88, sex., 2H; 2.62, s, 3H; 3.01, t, 2H; 3.18, quart., 2H; 3.30, s, 3H; 3.45, t, 2H; 4.32, quart., 2H; 5.12, t, 1H; 7.13, d, 1H, 7.97, dd, 1H, 8.53, d, 1H; 9.82, s, 1H.

Example 34

N-(2-N,N-Dimethylethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-benzenesulphonamide

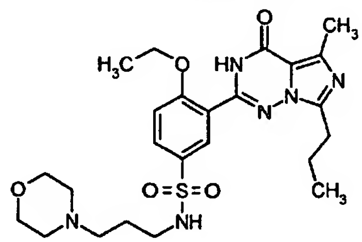


By the same method, starting with 210 mg (0.49 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 130 mg (9 mmol) of 2-N,N-dimethylethylamine, 150 mg (59%) of N-(2-N,N-dimethylethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-benzenesulphonamide are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H, 1.62, m, 4H; 1.88, sex., 2H; 2.11, s, 6H; 2.39, t, 2H; 2.63, s, 3H; 3.01, m, 3H; 4.38, quart., 2H; 7.13, d, 1H, 7.97, dd, 1H, 8.53, d, 1H; 9.82, s, 1H.

Example 35

N-[3-(1-Morpholino)propyl]-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-benzenesulphonamide

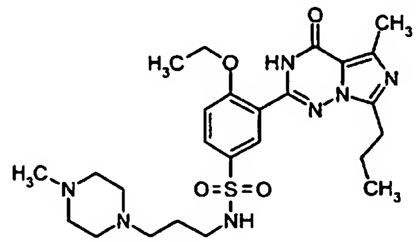


By the same method, starting with 1.23 g (3 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 1.3 g (9 mmol) of 3-(1-morpholino)-propylamine, 1.38 g (88%) of N-[3-(1-morpholino)propyl]-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-benzenesulphonamide are obtained.
R_f = 0.23 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H, 1.58, t, 3H; 1.72, m, 2H; 1.88, sex., 2H; 2.46, m, 6H; 2.62, s, 3H; 3.01, t, 2H; 3.15, t, 2H; 3.71, t, 4H; 4.32, quart., 2H; 7.13, d, 1H, 7.97, dd, 1H, 8.53, d, 1H; 9.79, s, 1H.

Example 36

N-{3-[1-(4-Methyl)piperazino]-propyl}-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-benzenesulphonamide



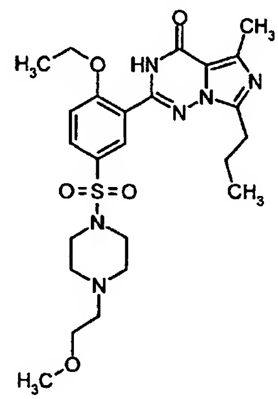
By the same method, starting with 0.04 g (0.097 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 0.05 g (0.29 mmol) of 3-[1-(4-methyl-)piperazino]-propylamine, 0.04 g (77%) of N-{3-[1-(4-methyl)piperazino]-propyl}-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-benzenesulphonamide is obtained.

R_f = 0.11 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H, 1.55, t, 3H;1.68, m, 2H; 1.88, sex., 2H; 2.27, s, 3H; 2.45, m, 8H; 2.62, s, 3H; 2.98, m, 3H; 3.10, t, 2H; 3.46, s, 1H; 4.30, quart., 2H; 7.13, d, 1H, 7.97, dd, 1H, 8.53, d, 1H.

Example 37

2-{2-Ethoxy-5-[4-(2-methoxy-ethyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

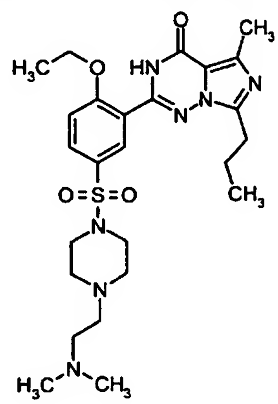


By the same method, starting with 40 mg (0.097 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 40 mg (0.29 mmol) of 4-methoxyethylpiperazine, 50 mg (99%) of 2-{2-ethoxy-5-[4-(2-methoxy-ethyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.27 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$):1.02, t, 3H; 1.61, t, 3H; 1.87, hex., 3H; 2.60, m, 9H; 2.97, t, 2H; 3.10, m, 4H; 3.60, s, 3H; 3.46, t, 2H; 4.36, quart., 2H; 7.18, d, 1H, 7.89, dd, 1H, 8.47, d, 1H, 9.71, s, 1H.

Example 38

2-{2-Ethoxy-5-[4-(2-N,N-dimethyl-ethyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



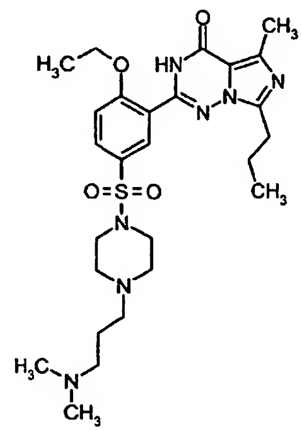
By the same method, starting with 40 mg (0.097 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 50 mg (0.29 mmol) of 4-(2-N,N-dimethyl)-ethylpiperazine, 50 mg (99%) of 2-{2-ethoxy-5-[4-(2-N,N-dimethyl-ethyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

R_f = 0.11 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$):1.02, t, 3H; 1.61, t, 3H; 1.87, hex., 3H; 2.20, s, 6H; 2.42, m, 4H; 2.58, m, 4H; 2.63, s, 3H; 2.99, m, 3H; 3.10, m, 4H; 4.36, quart., 2H; 7.18, d, 1H, 7.89, dd, 1H, 8.47, d, 1H, 9.71, s, 1H.

Example 39

2-{2-Ethoxy-5-[4-(3-N,N-dimethyl-propyl)-piperazin-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

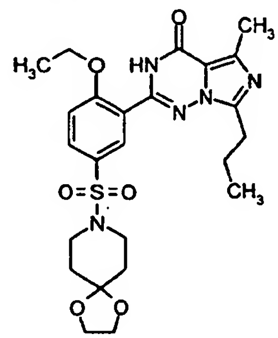


By the same method, starting with 100 mg (0.243 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 130 mg (0.73 mmol) of 4-(3-N,N-dimethyl)-propylpiperazine, 72 mg (54%) of 2-{2-ethoxy-5-[4-(3-N,N-dimethyl-propyl)-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.08 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$):1.02, t, 3H; 1.61, t, 3H; 1.87, sex., 3H; 2.20, s, 6H; 2.25, m, 2H; 2.38, t, 2H; 2.52, m, 4H; 2.63, s, 3H; 2.99, m, 6H; 4.33, quart., 2H; 7.18, d, 1H, 7.89, dd, 1H, 8.47, d, 1H, 9.71, s, 1H.

Example 40

2-[2-Ethoxy-5-(4-dioxolano-piperidine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

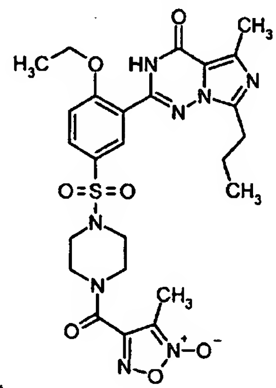


By the same method, starting with 100 mg (0.243 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 100 mg (0.73 mmol) of 4-dioxolanopiperidine, 111 mg (88%) of 2-[2-ethoxy-5-(4-dioxolano-piperidine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.61, t, 3H; 1.80, m, 6H; 2.63, s, 3H; 2.99, t, 2H; 3.20, m, 4H; 3.90, s, 4H; 4.33, quart., 2H; 7.18, d, 1H, 7.89, dd, 1H, 8.47, d, 1H, 9.71, s, 1H.

Example 41

2-[2-Ethoxy-5-(4-(5-methyl-4-furoxanecarbonyl)-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

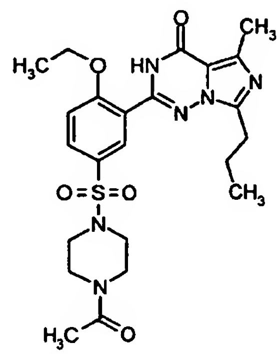


410 mg (1.0 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride are dissolved in 10 ml of dichloromethane and cooled to 0°C. 590 mg (2.00 mmol) of 1-(5-methyl-4-furoxanecarbonyl)-piperazine trifluoroacetate and 400 mg of triethylamine are added, and the reaction mixture is stirred at room temperature overnight. The mixture is diluted with dichloromethane, the organic phase is washed with ammonium chloride solution, 1M hydrochloric acid and water and dried over sodium sulphate and the solvent is removed under reduced pressure. Crystallization from ether gives 448 mg (74%) of a colourless solid.

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.59, t, 3H; 1.88, hex, 2H; 2.25, s, 3H; 2.63, s, 3H; 3.00, t, 2H; 3.20, m, 4H; 3.90, m, 2H; 4.02, m, 2H; 4.33, quart., 2H, 7.19, d, 1H; 7.89, dd, 1H; 8.48, d, 1H; 9.57, s, 1H.

Example 42

2-{2-Ethoxy-5-[4-acetyl-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

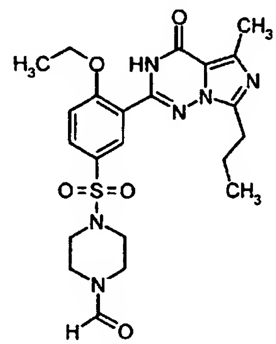


By the same method, starting with 40 mg (0.097 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 40 mg (0.29 mmol) of N-acetylpiperazine, 9 mg (18%) of 2-{2-ethoxy-5-[4-acetyl-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.34 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.61, t, 3H; 1.87, sex., 3H; 2.05, s, 3H; 2.63, s, 3H; 3.00, m, 6H; 3.59, m, 2H; 3.72, m, 2H; 4.33, quart., 2H; 7.18, d, 1H, 7.89, dd, 1H, 8.47, d, 1H, 9.71, s, 1H.

<u>Example 43</u>

2-{2-Ethoxy-5-[4-formyl-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



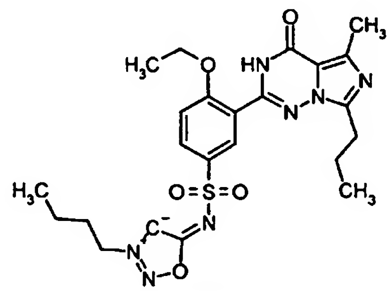
By the same method, starting with 40 mg (0.097 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 30 mg (0.29 mmol) of N-formylpiperazine, 35 mg (73%) of 2-{2-ethoxy-5-[4-formyl-piperazine-1-sulphonyl]-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

R_f = 0.29 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.61, t, 3H; 1.87, sex., 3H; 2.05, s, 3H; 2.63, s, 3H; 3.00, m, 6H; 3.50, m, 2H; 3.69, m, 2H; 4.33, quart., 2H; 7.18, d, 1H, 7.89, dd, 1H; 8.00, s, 1H; 8.47, d, 1H, 9.71, s, 1H.

Example 44

2-[2-Ethoxy-5-(3-butylsydnoneimine)-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



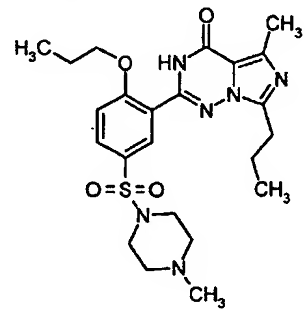
110 mg (0.6 mmol) of 3-butylsydnoneimine hydrochoride are dissolved in 2.5 ml of pyridine and cooled to 0°C. 210 mg (0.5 mmol) of 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride are added, and the reaction mixture is stirred for 2 hours at 0°C and overnight at room temperature. The mixture is diluted with dichloromethane, the organic phase is washed with water and dried over sodium sulphate and the solvent is removed under reduced pressure. Chromatography (dichloromethane/methanol) gives 16 mg (6%) of 2-[2-ethoxy-5-(3-butylsydnoneimine)-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one.

R_f = 0.41 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, 2t, 6H; 1.47, sex., 2H; 1.55, t, 3H; 1.88, m, 2H; 2.04, quin., 2H; 2.62, s, 3H; 2.98, t, 2H; 4.29, quart., 2H; 4.41, t, 2H; 7.08, d, 1H; 7.56, s, 1H; 7.98, dd, 1H; 8.58, d, 1H; 9.79, s, broad, 1H.

Example 45

5-Methyl-2-[5-(4-methyl-piperazine-1-sulphonyl)-2-propoxy-phenyl]-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



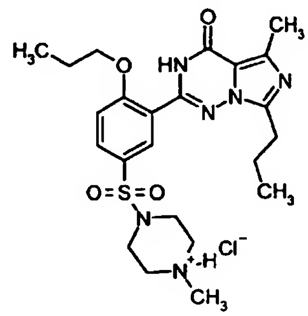
0.85 g (2 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]-triazin-2-yl)-benzenesulphonyl chloride are dissolved in 20 ml of dichloromethane and cooled to 0°C. After addition of a spatula tip of DMAP, 0.60 g (6.00 mmol) of N-methylpiperazine is added and the reaction mixture is stirred at room temperature overnight. The mixture is diluted with dichloromethane, the organic phase is washed with ammonium chloride solution and dried over sodium sulphate and the solvent is removed under reduced pressure. Crystallization from ether gives 0.80 g (77%) of a colourless solid.

R_f = 0.233 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.00, t, 3H; 1.15, t, 3H; 1.87, hex, 2H; 1.99, hex., 2H; 2.30, s, 3H; 2.52, m, 4H; 2.62, s, 3H; 2.99, t, 2H; 3.10, m, 4H; 4.21, t, 2H; 7.17, d, 1H; 7.87, dd, 1h, 8.48, d, 1H, 9.70, s, 1H.

Example 46

5-Methyl-2-[5-(4-methyl-piperazine-1-sulphonyl)-2-propoxy-phenyl]-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one hydrochloride

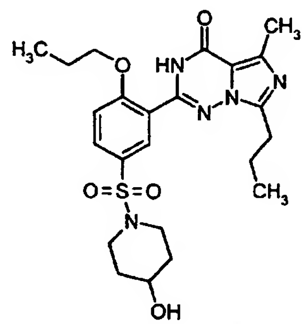


22 mg (0.045 mmol) of 5-methyl-2-[5-(4-methyl-piperazine-1-sulphonyl)-2-propoxy-phenyl]-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are dissolved in 2 ml of ether and 1 ml of dichloromethane and admixed with 0.1 ml of a 1M solution of HCl in ether. After 20 minutes, the precipitate is filtered off with suction and dried.

200 MHz ^{1}H-NMR ($CDCl_3$): 0.95, t, 3H; 1.75, m, 2H; 2.56, s, 3H; 2.75, m, 4H; 2.97, t, 2H; 3.15, m, 2H; 3.44, m, 2H; 3.81, m, 2H; 4.15, t, 2H; 7.47, d, 1H; 7.95, m, 2H; 11.12, s, 1H; 12.22, s, 1H.

Example 47

2-[5-(4-Hydroxypiperidine-1-sulphonyl)-2-propoxy-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one



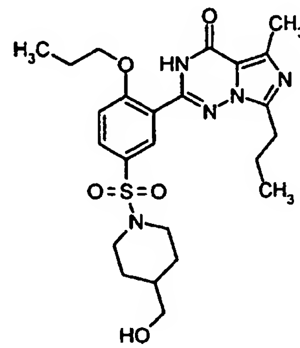
By the same method, starting with 850 mg (2 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 610 mg (6 mmol) of 4-hydroxypiperidine, 736 mg (75%) of 2-[5-(4-hydroxypiperidine-1-sulphonyl)-2-propoxy-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

R_f = 0.07 (dichloromethane/methanol = 95:5)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.16, t, 3H; 1.80, m, 9H; 2.65, s, 3H; 3.00, m, 4H; 3.32, m, 2H; 3.85,m, 1H; 4.22, t., 2H; 7.17, d,1H; 7.89, dd, 1H; 8.50, d, 1H; 11.70, s, 1H.

<u>Example 48</u>

2-[5-(4-Hydroxymethylpiperidine-1-sulphonyl)-2-propoxy-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

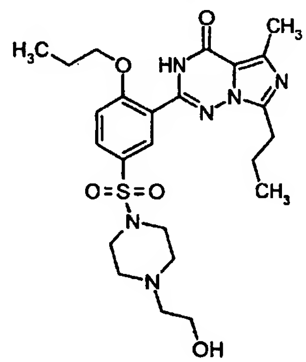


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 35 mg (0.3 mmol) of 4-hydroxymethylpiperidine, 41 mg (82%) of 2-[5-(4-hydroxymethylpiperidine-1-sulphonyl)-2-propoxy-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.52 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.001, t, 3H; 1.16, t, 3H; 1.60, m, 4H; 1.82, m, 5H; 2.31, t, 2H, 2.62, s, 3H, 2.98, t, 2H, ; 3.48, d, 2H; 3.85, d, 2H; 4.21, t, 2H; 7.,17, d, 1H; 7.88, dd, 1H, 8.45, d, 1H; 9. 71, s, 1H.

Example 49

2-{5-[4-(2-hydroxyethyl)-piperazine-1-sulphonyl]-2-propoxy-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

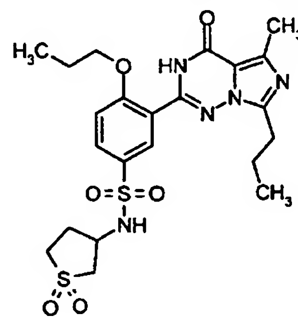


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 39 mg (0.3 mmol) of 4-hydroxymethylpiperazine, 50 mg (96%) of 2-{5-[4-(2-hydroxyethyl)-piperazine-1-sulphonyl]-2-propoxy-phenyl}-5-methyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.43 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.15, t, 3H, 1.88, m, 2H, 2.00, m, 2H, 2.62, m, 9H, 3.00, t, 2H, 3.07, m, 4H, 3.58, t, 2H, 4.23, t, 2H; 7.19, d, 1H; 7.88, dd, 1H, 8.43, d, 1H, 9.85, s, 1H.

Example 50

N-(1,1-Dioxotetrahydro-1λ^6-thiophene-3-yl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo- [5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide

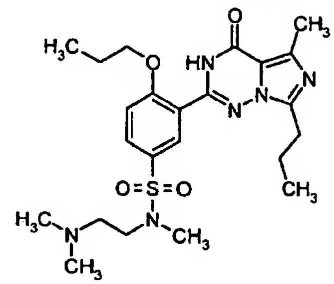


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 41 mg (0.3 mmol) of 2-aminosulpholane, 8 mg (14%) of N-(1,1-dioxotetrahydro-1λ^6-thiophene-3-yl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo-[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.
R_f = 0.49 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H, 1.15, t, 3H, 1.85, m, 2H; 1.99, m, 2H; 2.30, m, 1H; 2.50, m, 1H; 2.62, s, 3H; 2.95, m, 4H; 3.21, m, 1H; 4.20, m, 3H; 5.98, s, 1H; 7.18, d, 1H, 7.98, dd, 1H; 8.51,d, 1H, 9.71, s, 1H.

Example 51

N-(2-Dimethylaminoethyl)-N-methyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide

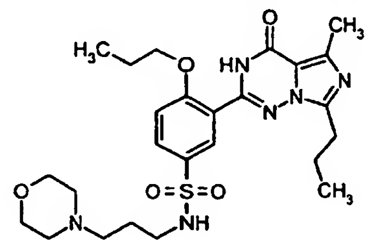


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 31 mg (0.3 mmol) of 1,1,4-trimethyldiaminoethane, 39 mg (79%) of N-(2-dimethylaminoethyl)-N-methyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.
R_f = 0.28 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H, 1.15, t, 3H, 1.88, m, 2H; 2.01, m, 2H; 2.25, s, 6H; 2.50, t, 2H; 2.62, s, 3H; 2.82, s, 3H; 3.01, t, 2H; 3.18, t, 2H; 4.21, t, 2H; 7.16, d, 1H, 7.91, dd, 1H, 8.50, d, 1H; 9.70, s, 1H.

Example 52

3-(5-Methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-N-(3-morpholin-4-yl-propyl)-4-propoxy-benzenesulphonamide

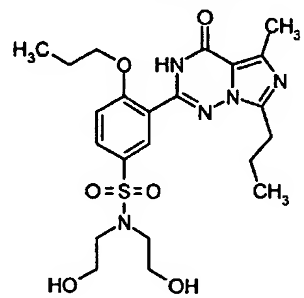


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 43 mg (0.3 mmol) of 1-(3-aminopropyl)-morpholine, 52 mg (97%) of 3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-N-(3-morpholin-4-yl-propyl)-4-propoxy-benzenesulphonamide are obtained.
R_f = 0.33 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H, 1.15, t, 3H, 1.71, m, 2H; 1.93, m, 4H; 2.43, m, 6H; 2.62, s, 3H; 2.98, t, 2H; 3.12, t, 2H; 3.70, m, 4H; 4.21, t, 2H; 7.15, d, 1H; 7.96, dd, 1H; 8.55, d, 1H; 9.85, s, 1H.

Example 53

N,N-Bis-(2-hydroxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide

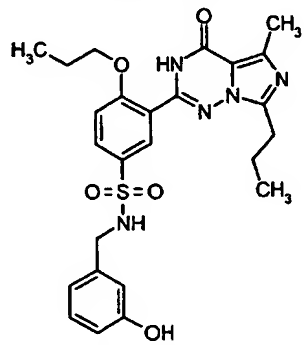


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 32 mg (0.3 mmol) of bishydroxyethylamine, 34 mg (69%) of N,N-bis-(2-hydroxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.
R_f = 0.36 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.15, t, 3H; 1.85, m, 2H; 1.97, m, 2H; 2.60, s, 3H; 2.98, t, 2H; 3.33, t, 4H; 3.87, t, 4H; 4.20, t, 2H; 7.15, d, 1H; 7.92, dd, 1H; 8.49, d, 1H; 9.85, s, 1H.

Example 54

N-(3-Hydroxybenzyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide

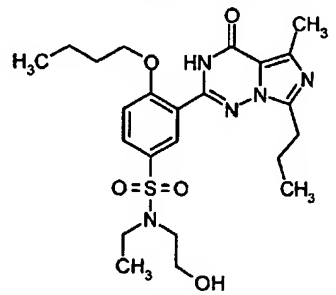


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 37 mg (0.3 mmol) of 3-hydroxybenzylamine, 4 mg (8%) of N-(3-hydroxybenzyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.
R_f = 0.43 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$):1.01, t, 3H, 1.13, t, 3H; 1.83, m, 2H; 1.96, m, 2H; 2.59, s, 3H, 2.96, t, 2H, 4.16, m, 4H, 5.05, t, 1H; 6.52, s, 1H; 6.70, m, 2H; 7.06, m, 2H; 7.93, dd, 1H, 8.41, d, 1H, 9.77, s, 1H.

Example 55

N-Ethyl-N-(2-hydroxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide

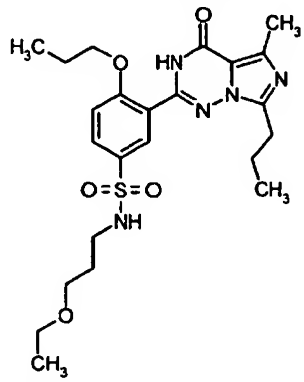


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 27 mg (0.3 mmol) of ethylhydroxyethylamine, 18 mg (38%) of N-ethyl-N-(2-hydroxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.
R_f = 0.48 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$):1.01, t, 3H; 1.15, 2t, 6H; 1.75, s, 2H; 1.85, m, 2H; 1.98, m, 2H; 2.40, s, 1H; 2.62, s, 3H; 2.99, t, 2H; 3.32, m, 4H; 3.90, quart., 2H, 4.21, quart., 2H; 7.15, d, 1H; 7.95, dd, 1H; 8.55, d, 1H, 9.73, s, 1H.

Example 56

N-(3-Ethoxypropyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide



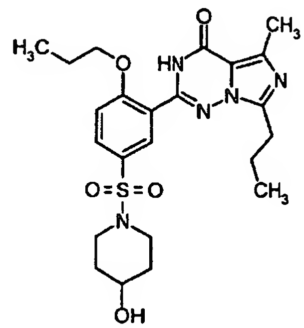
By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 31 mg (0.3 mmol) of 3-ethoxypropylamine, 47 mg (96%) of N-(3-ethoxypropyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.

R_f = 0.60 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.15, m, 6H; 1.89, m, 7H; 2.62, s, 3H; 3.00, t, 2H; 3.12, quart., 2H; 3.46, m, 4H; 4.20, t, 2H; 5.52, m, 1H; 7.15, d, 1H; 7.98, dd, 1H; 8.55, d, 1H, 9.85, s, 1H.

Example 57

2-[5(4-Hydroxypiperidine-1-sulphonyl)2-propoxy-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-*f*][1,2,4]triazin-4-one



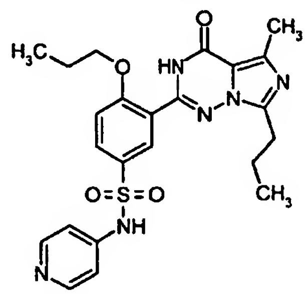
By the same method, starting with 212 mg (0.5 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 152 mg (1.5 mmol) of 4-hydroxypiperidine, 125 mg (50%) of 2-[5(4-hydroxypiperidine-1-sulphonyl)2-propoxy-phenyl]-5-methyl-7-propyl-3*H*-imidazo[5,1-*f*][1,2,4]triazin-4-one are obtained.

R_f = 0.07 (dichloromethane/methanol = 19:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.05, t, 3H; 1.18, t, 3H, 1.98, m, 8H, 2.71, s, 3H; 3.10, m, 2H; 3.28, m, 4H; 3.88, m, 1H; 4.28, t, 2H; 7.21, d, 1H; 7.97, dd, 1H, 8.45, d, 1H. 10.45, s, 1H.

Example 58

3-(5-Methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-N-pyridin-4-yl-benzenesulphonamide

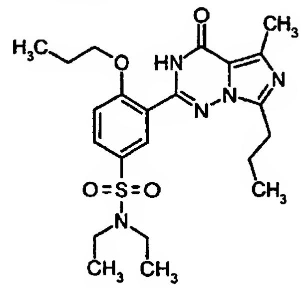


By the same method, starting with 85 mg (0.2 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 56 mg (0.6 mmol) of 4-aminopyridine, 24 mg (25%) of 3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-N-pyridin-4-yl-benzenesulphonamide are obtained after 18 hours at reflux in 1 ml of THF.
R_f = 0.13 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$ + CD_3OD): 1.01, t, 3H; 1.09, t, 3H; 1.90, m, 4H; 2.60, s, 3H; 2.99, t, 2H; 4.16, t, 2H; 7.05, d, 2H; 7.15, d, 1H; 7.88, d, 2H; 8.05, dd, 1H; 8.41, d, 1H.

Example 59

N,N-Diethyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide



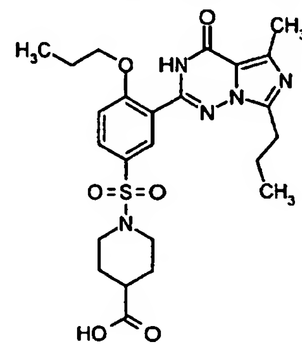
By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 22 mg (0.6 mmol) of diethylamine, 42 mg (92%) of N,N-diethyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.

R_f = 0.64 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.18, 2t, 9H; 1.92, 2 hex., 4H; 2.62, s, 3H; 3.00, t, 2H, 3.29, quart., 4H; 4.21, t, 2H; 7.13, d, 1H; 7.93, dd, 1H, 8.51, d, 1H, 9.85, s, 1H.

Example 60

1-[3-(5-Methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonyl]-piperidine-4-carboxylic acid

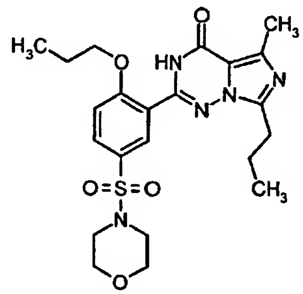


By the same method, starting from 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 14 mg (0.6 mmol) of piperidinecarboxylic acid in 1 ml of a mixture of THF and water (1:1) with 26.5 mg of sodium carbonate, 21 mg (41%) of 1-[3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonyl]-piperidine-4-carboxylic acid are obtained.
R_f = 0.28 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 0.90, t, 3H; 1.04, t, 3H; 1.80, m, 4H; 2.21, m, 2H, 2.51, s, 3H, 2.85, m, 2H, 3.56, m, 6H; 4.10, t, 2H; 7.12, d, 1H, 7.71, dd, 1H, 8.10, d, 1H, 10.72, s, broad, 1H.

Example 61

5-Methyl-2-[5-(morpholine-4-sulphonyl)-2-propoxy-phenyl]-7-propyl-3*H*-imidazo[5,1-*f*][1,2,4]triazin-4-one



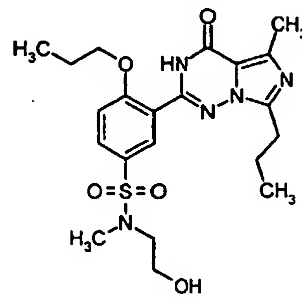
By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 26 mg (0.3 mmol) of morpholine, 34 mg (71%) of 5-methyl-2-[5-(morpholine-4-sulphonyl)-2-propoxy-phenyl]-7-propyl-3*H*-imidazo[5,1-*f*][1,2,4]triazin-4-one are obtained.

R_f = 0.64 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.16, t, 3H, 1.89, hex., 2H, 2.00, hex., 2H; 2.63, s, 3H; 3.02, m, 4H; 4.25, t, 2H, 7.19, d, 1H, 7.89, dd, 1H; 8.48, d, 1H; 9.78, s, 1H.

Example 62

N-(2-Hydroxyethyl)-N-methyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide

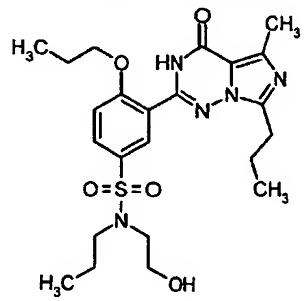


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 23 mg (0.63 mmol) of methylhydroxyethylamine, 25 mg (54%) of N-(2-hydroxyethyl)-N-methyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.
R_f = 0.53 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.15, t, 3H; 1.82, m, 2H; 1.99, hex., 2H; 2.40, s, broad, 1H, 2.62, s, 3H, 2.89, s, 3H; 2.99, t, 2H; 3.21, t, 2H; 3.80, s, broad, 2H; 4.21, t, 2H, 7.16, d, 1H; 7.92, dd, 1H, 8.50, d, 1H, 9.79, s, 1H.

Example 63

N-(2-Hydroxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-N-propyl-benzenesulphonamide

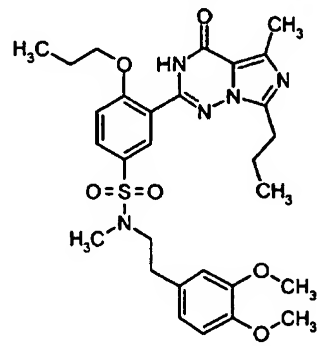


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 31 mg (0.6 mmol) of propylhydroxyethylamine, 20 mg (40%) of N-(2-hydroxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]-triazin-2-yl)-4-propoxy-N-propyl-benzenesulphonamide are obtained.
R_f = 0.52 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 0.90, t, ,3H; 1.01, t, 3H; 1.15, t, 3H; 1.52, m, 2H, 1.88, m, 2H, 2.00, m, 2H; 2.40, s, 1H; 2.63, s, 3H, 3.01, t, 2H, 3.22, m, 4H; 3.80, quart., 2H; 4.21, t, 2H, 7.15, d, 2H, 7.95, dd, 1H, 8.55, d, 1H; 9.75, s, 1H.

Example 64

N-[2-(3,4-Dimethoxy-phenyl)ethyl]-N-methyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide



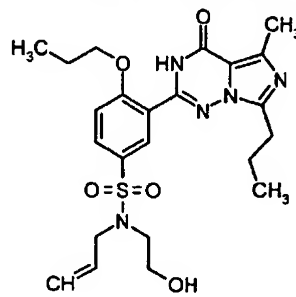
By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 59 mg (0.3 mmol) of N-methyl-3,4-dimethoxyphenylethylamine, 45 mg (78%) of N-[2-(3,4-dimethoxyphenyl)-ethyl]-N-methyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.

R_f = 0.35 (dichloromethane/methanol = 19:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 0.90, t, 3H; 1.07, t, 3H; 1.78, m, 2H; 1.92, m, 2H; 2.55, s, 3H; 2.73, s, 3H; 2.78, m, 2H; 2.89, t, 2H; 3.23, t, 2H, 3.80, s, 6H, 4.15, t, 2H, 6.65, m, 3H, 7.05, d, 1H, 7.75, dd, 1H, 8.41, d, 1H, 9.67, s, 1H.

Example 65

N-Allyl-N-(2-hydroxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide

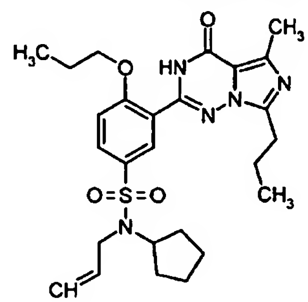


By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 31 mg (0.3 mmol) of allylhydroxyethylamine, 34 mg (70%) of N-allyl-N-(2-hydroxyethyl)-3-(5-methyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.
R_f = 0.52 (dichloromethane/methanol = 9:1)

200 MHz ^{1}H-NMR ($CDCl_3$):1.01, t, 3H; 1.15, t, 3H; 1.85, m, 2H; 1.99, m, 2H; 2.38, s, broad, 1H, 2.63, s, 3H; 3.00, t, 2H, 3.32, t, 2H, 3.86, t, 2H, 3.90, d, 2H; 4.25, t, 2H, 5.21, m, 2H, 5.71, m, 1H; 7.15, d, 1h, 7.95, dd, 1H; 8.55, d, 1H, 9.77, s, 1H.

Example 66

N-Allyl-N-cyclopentyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide



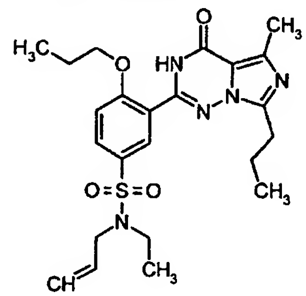
By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 38 mg (0.3 mmol) of allylcyclopentylamine, 33 mg (64%) of N-allyl-N-cyclopentyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.

R_f = 0.43 (dichloromethane/methanol = 19:1)

200 MHz ^{1}H-NMR ($CDCl_3$):1.01, t, 3H;1.15, t, 3H; 1.53, m, 9H; 2.00, m, 4H, 2.63, s, 3H; 3.00, t, 2H; 3.80, m, 2H, 4.21, t, 2H, 5.20, m, 2H; 5.88, m, 1H, 7.12, d, 1H, 7.95, dd, 1H, 8.55, d, 1H, 9.75, s, 1H.

Example 67

N-Allyl-N-ethyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]-triazin-2-yl)-4-propoxybenzenesulphonamide



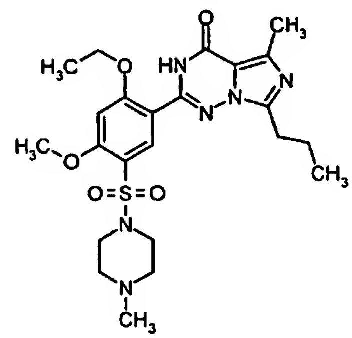
By the same method, starting with 42 mg (0.1 mmol) of 4-propoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 26 mg (0.3 mmol) of allylethylamine, 30 mg (64%) of N-allyl-N-ethyl-3-(5-methyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-4-propoxy-benzenesulphonamide are obtained.

R_f = 0.44 (dichloromethane/methanol = 19:1)

200 MHz ^{1}H-NMR ($CDCl_3$):1.01, t, 3H;1.15, t, 6H;1.89, m, 2H, 2.01, m, 2H, 2.63, s, 3H, 3.00, t, 2H, 3.27, quart., 2H, 3.87, d, 2H, 4.23, t, 2H, 5.20, m, 2H, 5.72, m, 1H; 7.15, d, 1H, 7.95, dd, 1H, 8.55, d, 1H; 9.80, s, 1H.

Example 68

2-[2-Ethoxy-4-methoxy-5-(4-methylpiperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3H-imidazo[5,1-f][1,2,4]triazin-4-one

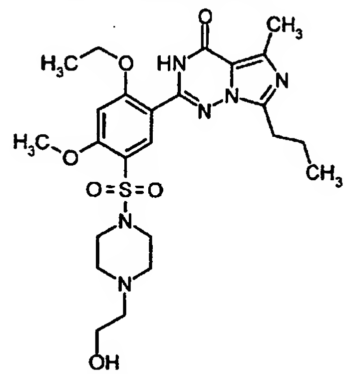


20 mg (0.045mmol) of 4-ethoxy-2-methoxy-5-(5-methyl-4-oxo-7-propyl-3,4-dihydroimidazo-[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride are dissolved in 0.5 ml of dichloromethane and admixed with a spatula tip of dimethylaminopyridine and 14 mg (0.136 mmol) of N-methylpiperazine, and the reaction mixture is stirred at room temperature overnight. Purification over silica gel gives 12.8 mg (55%) of 2-[2-ethoxy-4-methoxy-5-(4-methylpiperazine-1-sulphonyl)phenyl]-5-methyl-7-propyl-3H-imidazo[5,1-f][1,2,4]triazin-4-one.
R_f = 0.22 (dichloromethane/methanol = 20:1).

200 MHz ^{1}H-NMR ($CDCl_3$): 0.94, t, 3H; 1.55, t, 3H; 1.80, m, 2H; 2.24, s, 3H; 2.42, t, 4H; 2.55, s, ,3H; 2.92, t, 2H; 3.19, t, 4H, 3.91, s, 3H; 4.25, quart., 2H; 6.48, s, 1H; 8.57, s, 1H; 9.54, s, 1H.

Example 69

2-{2-Ethoxy-5-[4-(2-hydroxyethyl)-piperazine-1-sulphonyl]-4-methoxy-phenyl}-5-methyl-7-propyl-3H-imidazo[5,1-f][1,2,4]triazin-4-one



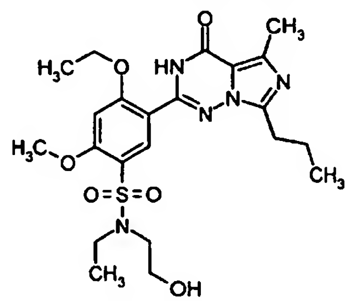
By the same method, starting with 20 mg (0.045 mmol) of 4-ethoxy-2-methoxy-5-(5-methyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 18 mg (0.14 mmol) of 4-hydroxyethylpiperazine, 11 mg (46%) of 2-{2-ethoxy-5-[4-(2-hydroxyethyl)-piperazine-1-sulphonyl]-4-methoxyphenyl}-5-methyl-7-propyl-3H-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

R_f = 0.34 (dichloromethane/methanol = 15:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 0.94, t, 3H; 1.55, t, 3H; 1.80, m, 3H; 2.52, m, 9H; 2.92, t, 2H; 3.20, t, 4H; 3.44, t, 2H; 3.92, s, 3H; 4.25, quart., 2H; 6.49, s, 1H; 8.56, s, 1H; 9.55, s, 1H.

Example 70

4-Ethoxy-N-ethyl-N-(2-hydroxyethyl)-2-methoxy-5-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonamide



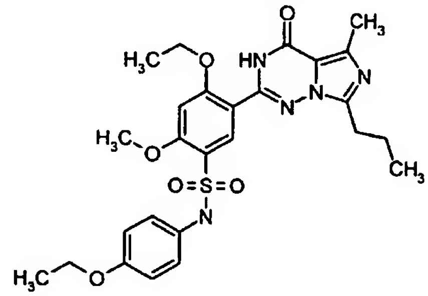
By the same method, starting from 20 mg (0.045 mmol) of 4-ethoxy-2-methoxy-5-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 12 mg (0.14 mmol) of ethylhydroxyethylamine, 8 mg (34%) of 4-ethoxy-N-ethyl-N-(2-hydroxyethyl)-2-methoxy-5-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonamide are obtained.

R_f = 0.45 (dichloromethane/methanol = 15:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.18, t, 3H; 1.61, t, 2H; 1.88, m, 2H; 2.39, s, broad, 1H; 2.65, s, 3H; 3.00, t, 2H; 3.38, quart., 2H; 3.45, t, 2H; 3.78, m, 2H; 4.01, s, 3H; 4.20, quart., 2H; 6.58, s, 1H; 8.67, s, 1H; 9.61, s, 1H.

Example 71

4-Ethoxy-N-(4-ethoxyphenyl)-2-methoxy-5-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonamide

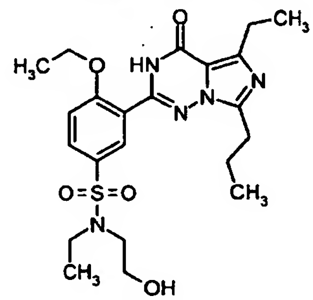


By the same method, starting with 20 mg (0.045 mmol) of 4-ethoxy-2-methoxy-5-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzene-sulphonyl chloride and 19 mg (0.14 mmol) of 4-ethoxyaniline, 7 mg (34%) of 4-ethoxy-N-(4-ethoxyphenyl)-2-methoxy-5-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonamide are obtained.
R_f = 0.36 (dichloromethane/methanol = 20:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.33, t, 3H, 1.59, t, 3H, 1.86, hex., 2H, 2.62, s, 3H; 3.02, t, 2H; 3.92, quart., 2H; 4.11, s, 3H; 4.31, quart., 2H; 6.58, s, 1H, 6.72, d, 2H; 6.88, s, broad, 1H; 6.99, d, 2H, 8.50, s, 1H; 9.59, s, 1H.

Example 72

4-Ethoxy-N-ethyl-N-(2-hydroxy-ethyl)-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)benzenesulphonamide

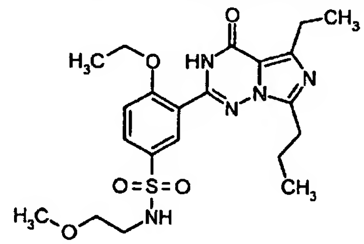


0.64 g (1.5 mmol) of 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride are dissolved in 20 ml of dichloromethane and cooled to 0°C. After addition of a spatula tip of dimethylaminopyridine, 0.40 g (4.50 mmol) of 2-(ethylamino)-ethanol are added, and the reaction mixture is stirred at room temperature overnight. The mixture is diluted with dichloromethane, the organic phase is washed with water and dried over sodium sulphate and the solvent is removed under reduced pressure. Chromatography (dichloromethane/methanol = 95:5) gives 0.454 g (63%) of a colourless solid.

200 MHz ^{1}H-NMR ($CDCl_3$):1.02, t, 3H; 1.20, t, 3H; 1.35, t, 3H; 1.61, t, 3H; 1.88, sex., 2H; 2.25, s, broad, 1H; 3.01, m, 4H; 3.32, m, 4H; 3.70, m, 2H; 3.80, m, 2H; 4.37, quart., 2H; 7.15, d, 1H; 7.98, dd, 1H; 8.56, d, 1H; 9.70, s, 1H.

Example 73

N-(2-Methoxyethyl)-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxybenzenesulphonamide



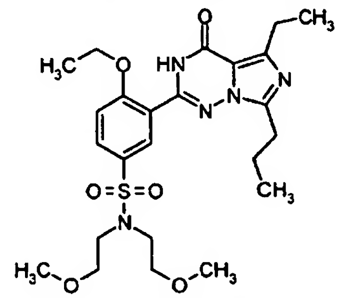
By the same method, starting with 40 mg (0.094 mmol) of 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 21 mg (0.282 mmol) of 2-methoxyethylamine, 15 mg (34%) of N-(2-methoxyethyl)-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxybenzenesulphonamide are obtained.

R_f = 0.2 (ethyl acetate/cyclohexane = 2:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 0.97, t, 3H;1.25, t, 3H; 1.53, t, 3H; 1.82, sex., 2H; 2.97, m, 4H; 3.11, m, 2H; 3.22, s, 3H; 3.39, t, 2H; 4.37, quart., 2H; 5.00, t, 1H; 7.17, d, 1H, 7.97, dd, 1H, 8.53, d, 1H; 9.82, s, 1H.

Example 74

N,N-Bis-(2-methoxyethyl)-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxybenzenesulphonamide



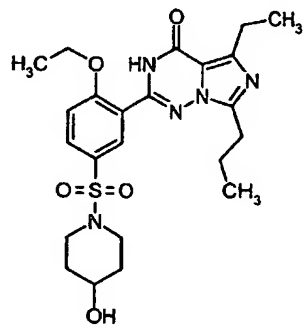
By the same method, starting with 40 mg (0.094 mmol) of 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 38 mg (0.28 mmol) of bismethoxyethylamine, 17 mg (34%) of N,N-bis-(2-methoxyethyl)-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxybenzenesulphonamide are obtained.

R_f = 0.34 (ethyl acetate/cyclohexane = 2:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 0.97, t, 3H;1.27, t, 3H; 1.53, t, 3H; 1.80, sex., 2H; 2.95, m, 4H; 3.22, s, 6H; 3.39, m, 4H; 3.49, m, 4H; 4.27, quart., 2H; 7.17, d, 1H, 7.97, dd, 1H, 8.53, d, 1H; 9.82, s, 1H.

Example 75

2-[5-(4-Hydroxypiperidine-1-sulphonyl)-2-ethoxyphenyl]-5-ethyl-7-propyl-3*H*-imidazo[5,1-*f*]-[1,2,4]triazin-4-one



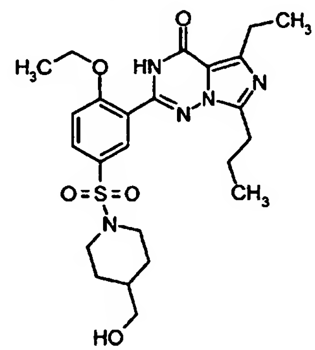
By the same method, starting with 640 mg (1.5 mmol) of 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 460 mg (4.5 mmol) of 4-hydroxypiperidine, 485 mg (66%) of 2-[5-(4-hydroxy-piperidine-1-sulphonyl)-2-ethoxyphenyl]-5-ethyl-7-propyl-3*H*-imidazo[5,1-*f*][1,2,4]triazin-4-one are obtained.

R_f = 0.37 (dichloromethane/methanol = 19:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.02, t, 3H; 1.32, t, 3H; 1.60, t, 3H; 1.80, m, 7H; 2.97, m, 6H; 3.30, m, 2H; 3.82, m, 1H; 4.34, quart., 2H; 7.17, d, 1H; 7.90, dd, 1H, 8.45, d, 1H. 9.75, s, 1H.

Example 76

2-[5-(4-Hydroxymethylpiperidine-1-sulphonyl)-2-ethoxy-phenyl]-5-ethyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

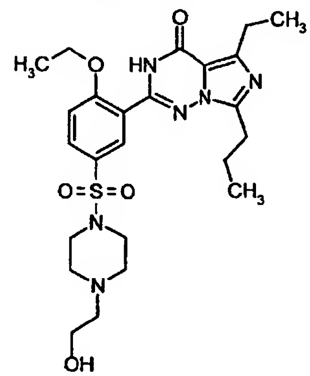


By the same method, starting with 40 mg (0.094 mmol) of 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 33 mg (0.28 mmol) of 4-hydroxymethylpiperidine, 23 mg (48%) of 2-[5-(4-hydroxymethylpiperidine-1-sulphonyl)-2-ethoxyphenyl]-5-ethyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.
R_f = 0.38 (dichloromethane/methanol = 10:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.33, t, 3H; 1.60, t, 3H; 1.80, m, 8H; 2.41, m, 2H, 3.00, m, 4H; 3.56, m, 4H; 4.35, quart, 2H; 7.,17, d, 1H; 7.88, dd, 1H, 8.45, d, 1H; 9.71, s, 1H.

Example 77

2-{2-Ethoxy-5-[4-(2-hydroxyethyl)-piperazine-1-sulphonyl]-phenyl}-5-ethyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one

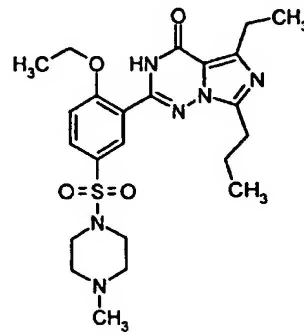


By the same method, starting with 40 mg (0.094 mmol) of 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 37 mg (0.28 mmol) of 4-hydroxyethylpiperazine, 35 mg (71%) of 2-{2-ethoxy-5-[4-(2-hydroxyethyl)-piperazine-1-sulphonyl]-phenyl}-5-ethyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

R_f = 0.65 (dichloromethane/methanol = 10:1)

Example 78

2-[2-Ethoxy-5-(4-methylpiperazine-1-sulphonyl)-phenyl]-5-ethyl-7-propyl-3*H*-imidazo[5,1-f]-[1,2,4]triazin-4-one



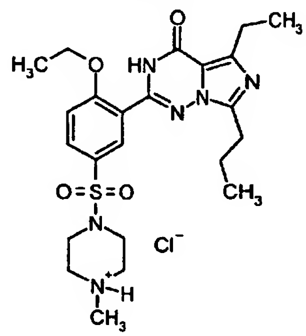
By the same method, starting with 640 mg (1.50 mmol) of 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 450 mg (4.5 mmol) of 4-hydroxyethylpiperazine, 495 mg (66%) of 2-[2-ethoxy-5-(4-methylpiperazine-1-sulphonyl)-phenyl]-5-ethyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are obtained.

R_f = 0.30 (dichloromethane/methanol = 19:1)

200 MHz ^{1}H-NMR ($CDCl_3$):1.01, t, 3H; 1.35, t, 3H; 1.61, t, 3H; 1.89, sex., 2H; 2.31, s, 3H; 2.53, m, 4H; 3.05, m, 8H; 4.35, quart., 2H; 7.17, d, 1H; 7.89, dd, 1H; 8.48, d, 1H; 9.65, s, 1H.

Example 79

2-[2-Ethoxy-5-(4-methylpiperazine-1-sulphonyl)-phenyl]-5-ethyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one hydrochloride

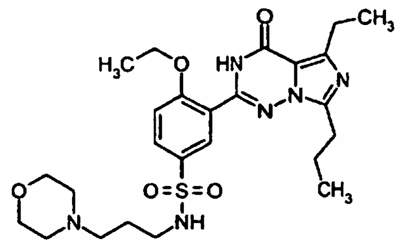


300 mg (0.61 mmol) of 2-[2-ethoxy-5-(4-methyl-piperazine-1-sulphonyl)-phenyl]-5-ethyl-7-propyl-3*H*-imidazo[5,1-f][1,2,4]triazin-4-one are dissolved in a mixture of ether and dichloromethane and admixed with 2 ml of a 1M solution of HCl in ether. After 20 minutes, the precipitated solid is filtered off with suction and dried.

200 MHz ^{1}H-NMR (DMSO-d_6): 0.95, t, 3H; 1.32, 2t, 6H; 1.80, sex., 2H; 2.76, m, 4H; 3.01, m, 4H; 3.15, m, 2H; 3.44, m, 2H; 3.81, m, 2H; 4.25, quart., 2H; 7.49, d, 1H; 7.95, m, 2H; 11.25, s, 1H; 12.30, s, 1H.

<u>**Example 80**</u>

3-(5-Ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-N-(3-morpholin-4-yl-propyl)-4-ethoxybenzenesulphonamide

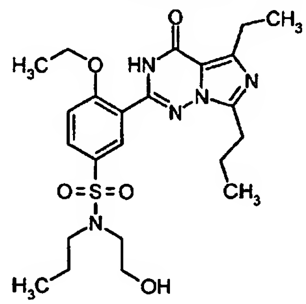


By the same method, starting with 640 mg (1.5 mmol) of 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 650 mg (4.5 mmol) of 1-(3-aminopropyl)-morpholine, 476 mg (59%) of 3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-N-(3-morpholin-4-yl-propyl)-4-ethoxy-benzenesulphonamide are obtained.
R_f = 0.18 (dichloromethane/methanol = 19:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 1.01, t, 3H; 1.32, t, 3H; 1.60, t, 3H; 1.70, m, 3H; 1.89, sex., 2H; 2.43, m, 7H; 3.01, m, 4H; 3.15, t, 2H; 3.70, m, 4H; 4.35, quart., 2H; 7.15, d, 1H; 7.95, dd, 1H; 8.55, d, 1H; 9.82, s, 1H.

Example 81

N-(2-Hydroxyethyl)-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-N-propyl-benzenesulphonamide



By the same method, starting with 640 mg (1.5 mmol) of 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydroimidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and 464 mg (4.5 mmol) of propylhydroxyethylamine, 600 mg (81%) of N-(2-hydroxyethyl)-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-4-ethoxy-N-propylbenzenesulphonamide are obtained.
R_f = 0.73 (dichloromethane/methanol = 10:1)

200 MHz ^{1}H-NMR ($CDCl_3$): 0.91, t, ,3H; 1.01, t, 3H; 1.32, t, 3H; 1.62, m, 5H; 1.88, m, 2H; 2.32, s, 1H; 3.01, m, 4H; 3.22, m, 4H; 3.80, m, 2H; 4.35, t, 2H; 7.15, d, 2H, 7.95, dd, 1H, 8.55, d, 1H; 9.75, s, 1H.

The sulphonamides listed in Tables 1, 2, 3, 4 and 6 below were prepared by means of automated parallelsynthesis from 4-ethoxy-3-(5-methyl-4-oxo-7-propyl-3,4-dihydro-imidazo[5,1-f][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and the appropriate amine using one of the three standard procedures below.

The sulphonamides listed in Table 5 were prepared by the same methods by means of automated parallelsynthesis from 4-ethoxy-3-(5-ethyl-4-oxo-7-propyl-3,4-dihydro-

imidazo[5,1-δ][1,2,4]triazin-2-yl)-benzenesulphonyl chloride and the appropriate amine.

The purity of the final products was determined by means of HPLC, and they were characterized by LC-MS. The content of the desired compound according to HPLC-MS is given in per cent in the tables in the column "HPLC". Standard procedure A was used with amines having acidic functionalities, standard procedure B was used with amines having neutral functionalities, standard procedure C was used with amines having additional basic functionalities.

In the structural formulae of Tables 1, 2, 3, 4, 5 and 6 below, hydrogen atoms are in some cases not shown. Nitrogen atoms having a free valency are therefore to be understood as -NH- radical.

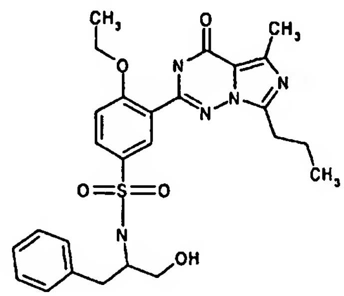
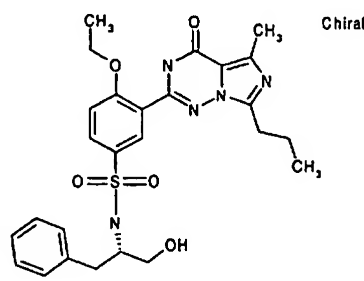
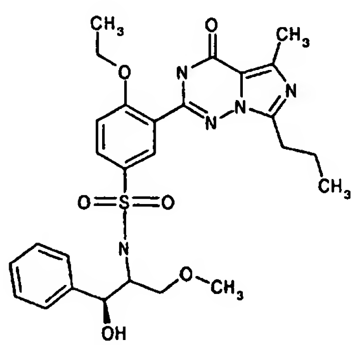
<u>Standard procedure A:</u> Reaction of amines having acidic functionalities
0.05 mmol of amine, 0.042 mmol of sulphonyl chloride and 0.10 mmol of Na_2CO_3 are initially charged, and 0.5 ml of a mixture of THF/H_2O is pipetted in by hand. After 24 h at RT, the mixture is admixed with 0.5 ml of 1M H_2SO_4 solution and filtered through a two-phase cartridge (500 mg of Extrelut (upper phase) and 500 mg of SiO_2, mobile phase ethyl acetate). The product is obtained after concentrating the filtrate under reduced pressure.

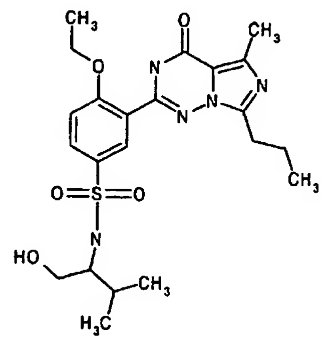
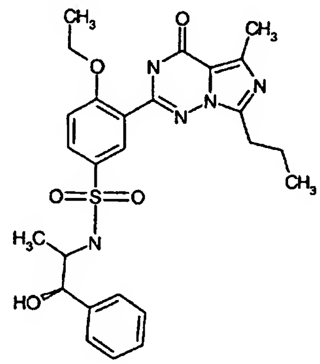
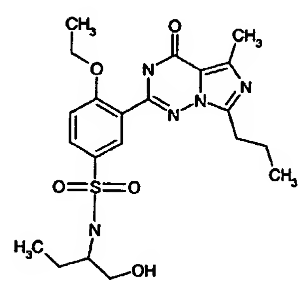
<u>Standard procedure B:</u> Reaction of amines having neutral functionalities
0.125 mmol of amine are initially charged and 0.03 mmol of sulphonyl chloride as a solution in 1,2-dichloroethane is pipetted in by the synthesizer. After 24 h, the mixture is admixed with 0.5 ml of 1M H_2SO_4 and filtered through a two-phase cartridge (500 mg of Extrelut (upper phase) and 500 mg of SiO_2, mobile phase: ethyl acetate). The filtrate is concentrated under reduced pressure.

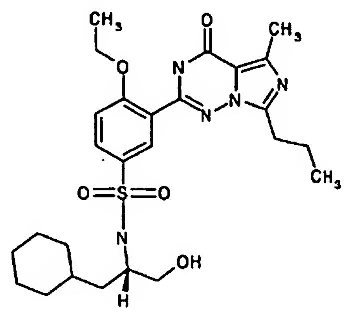
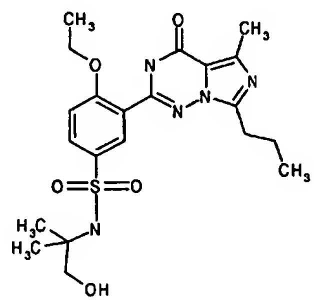
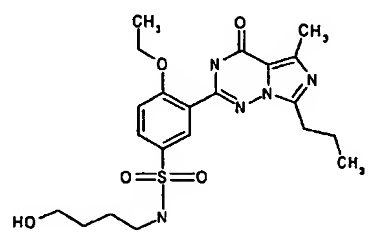
Standard procedure C: Reaction of amines having basic functionalities
0.05 mmol of amine are initially charged and 0.038 mmol of sulphonyl chloride as a solution in 1,2-dichloroethane and 0.05 mmol of triethylamine as a solution in 1,2-dichloroethane is pipetted in by the synthesizer. After 24 h, the solution is initially admixed with 3 ml of saturated $NaHCO_3$ solution and the reaction mixture is filtered through a two-phase cartridge. The product is obtained after concentrating the filtrate under reduced pressure.

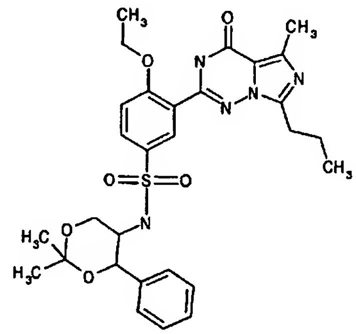
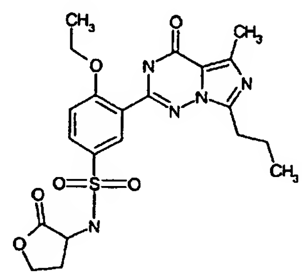
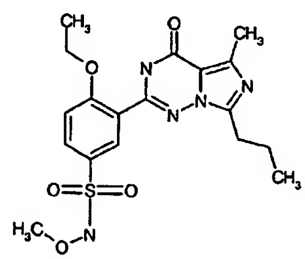
All reactions are monitored by thin-layer chromatography. If the reaction is not complete after 24 h at RT, the mixture is heated to 60°C for a further 12 h and the experiment is subsequently terminated.

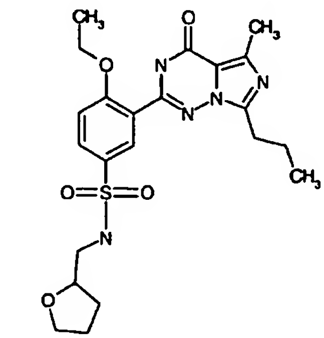
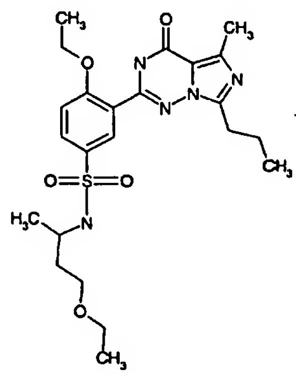
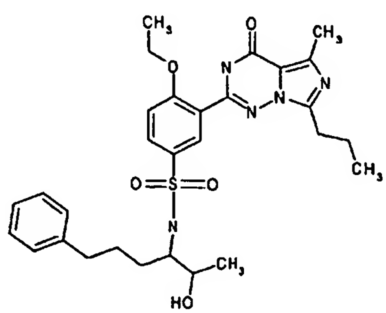
Table 1:

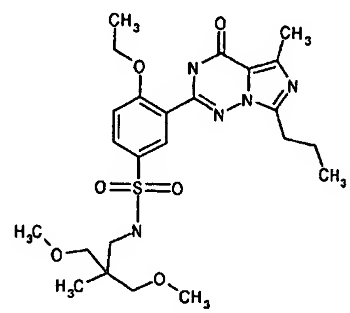
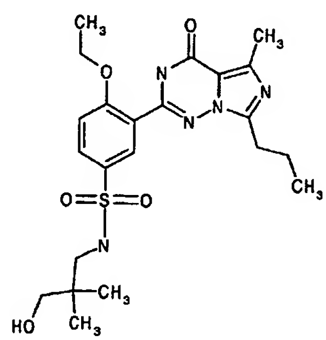
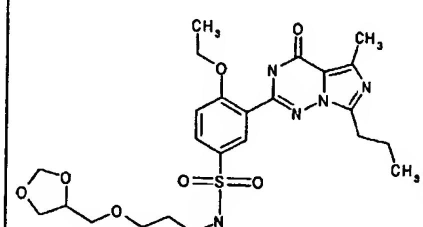
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
82		525.6315	83	526
83		525.6315	71	526
84		555.658	91	556

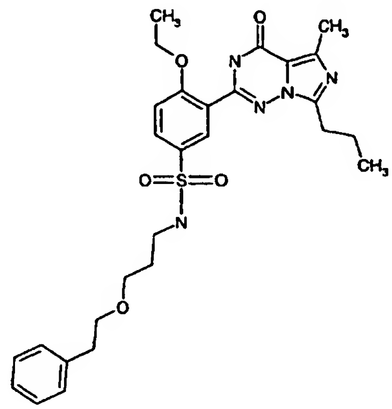
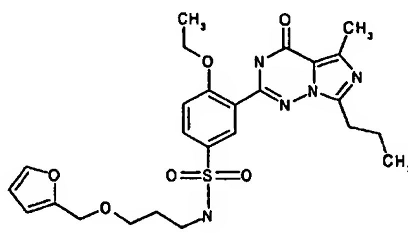
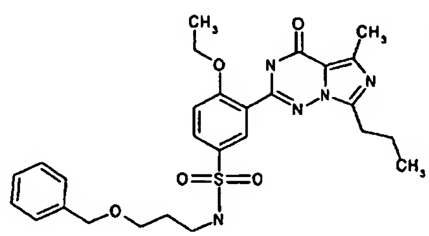
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
85		477.5869	76	478
86		525.6315	81	526
87		463.5598	65	464

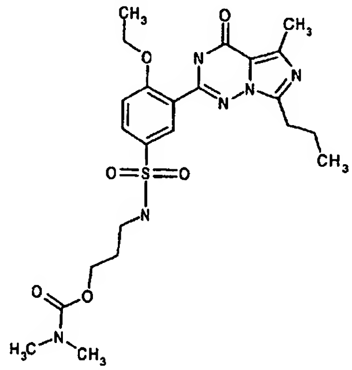
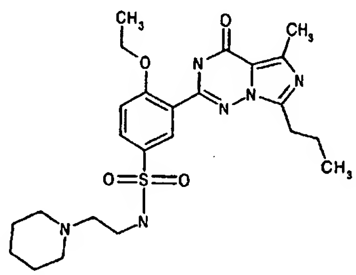
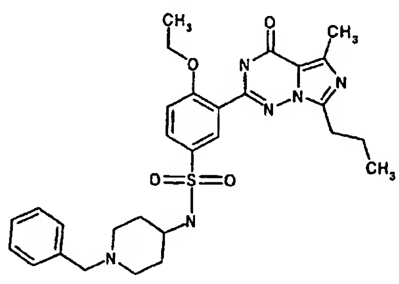
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
88		531.6793	83	532
89		463.5598	40	464
90		463.5598	44	464

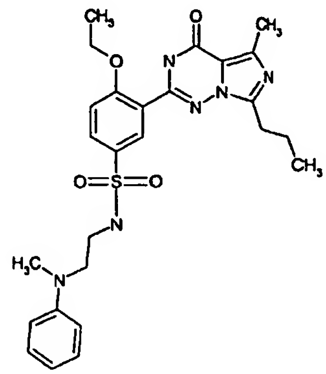
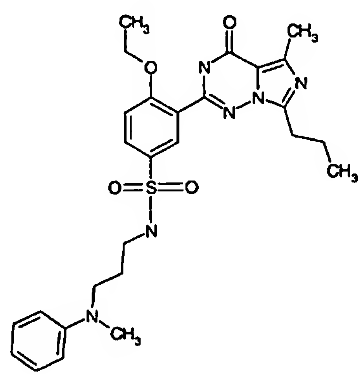
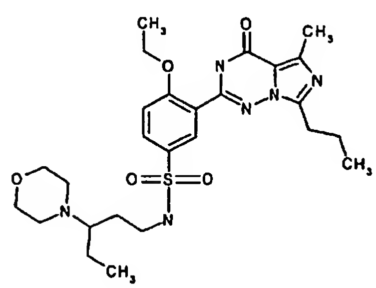
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
91		581.6962	76	582
92		475.5273	61	476
93		421.4785	80	422

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
94		475.5709	81	476
95		491.614	97	492
96		567.7127	80	568

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
97		521.6405	94	522
98		477.5869	70	478
99		535.6239	88	536

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
100		553.6857	88	554
101		529.6197	85	530
102		539.6586	91	540

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
103		520.6121	55	521
104		502.6404	82	503
105		564.7121	86	565

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
106		524.6467	85	525
107		538.6738	85	539
108		546.694	84	547

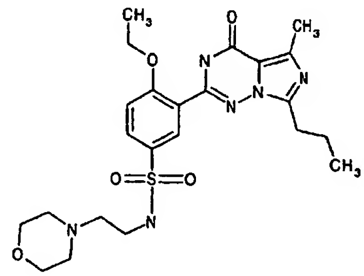
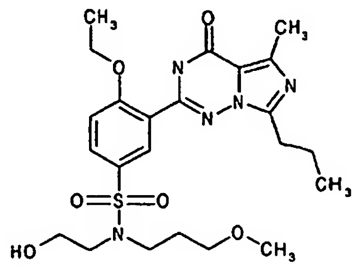
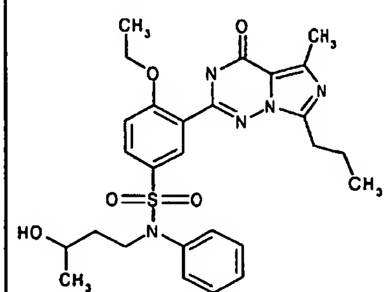
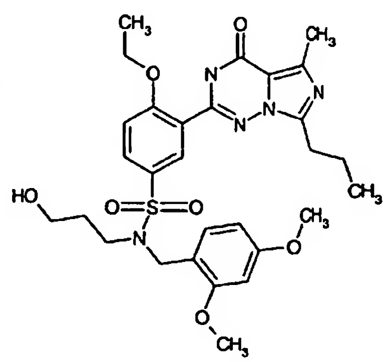
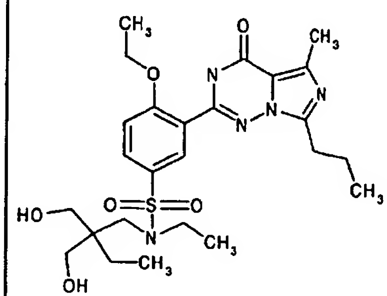
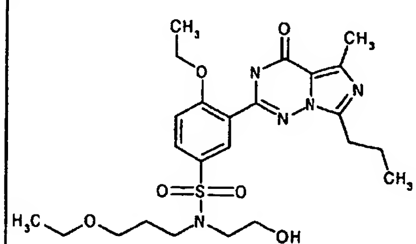
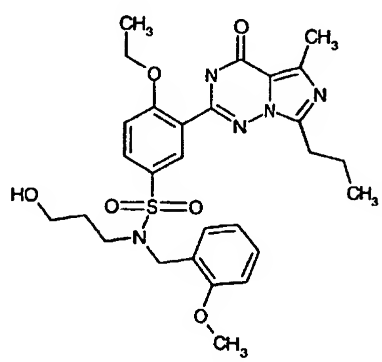
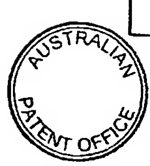
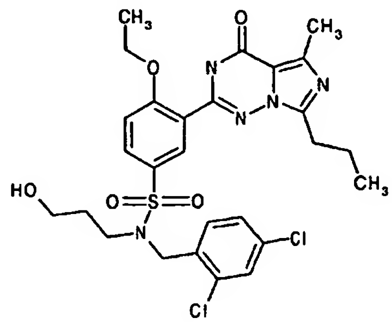
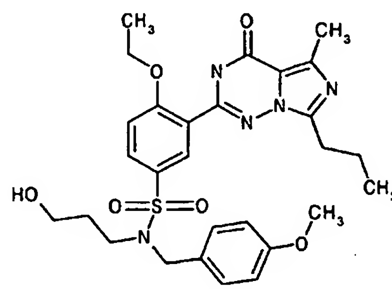
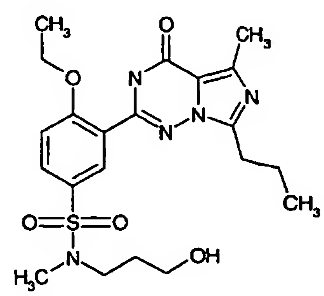
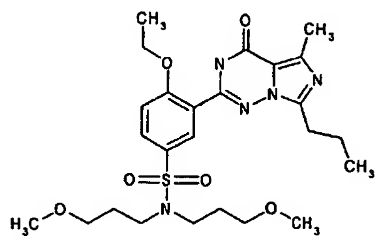
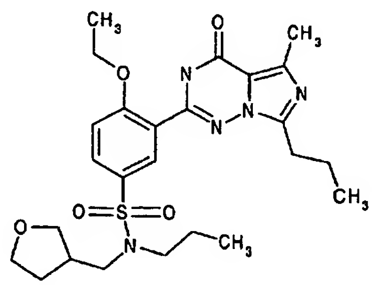
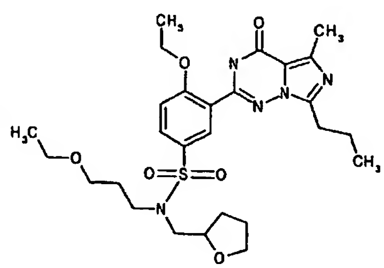
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
109		504.6127	90	505

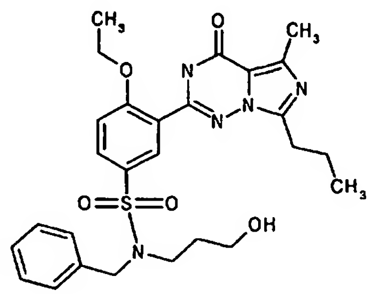
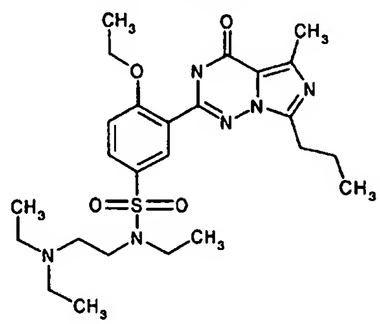
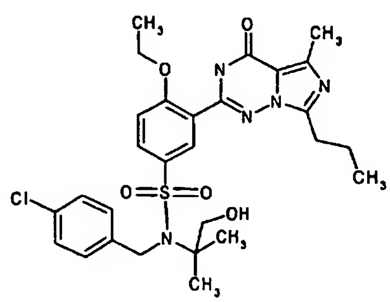
Table 2:				
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
110		507.6134	74	508
111		539.6586	75	540
112		599.7115	83	600

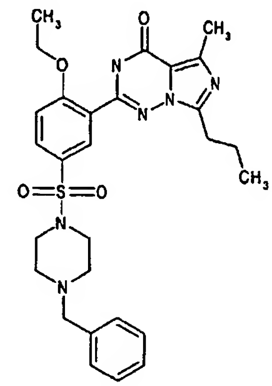
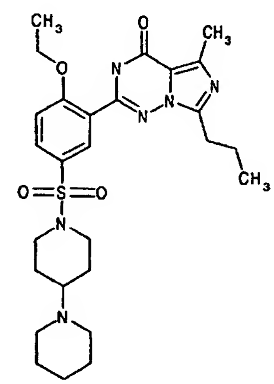
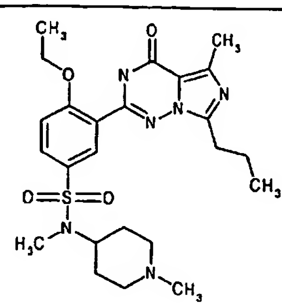
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
113		535.6675	60	536
114		521.6405	95	522
115		569.6851	84	570

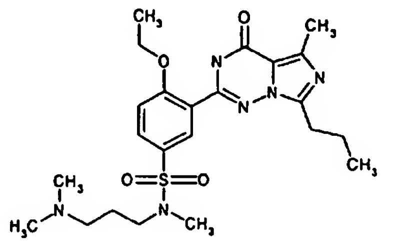
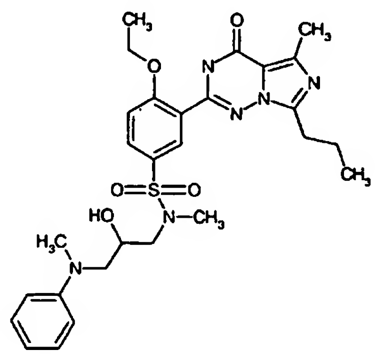
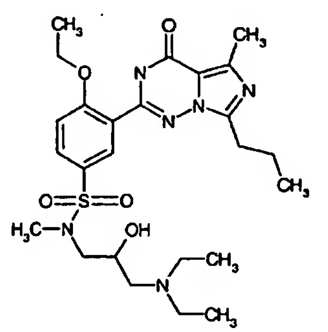


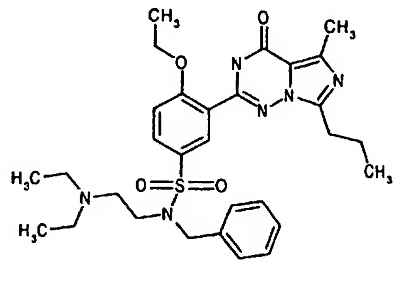
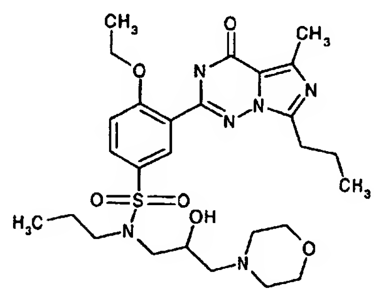
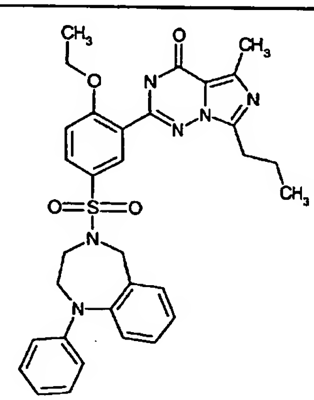
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
116		608.5486	85	608
117		569.6851	88	570
118		463.5598	94	464

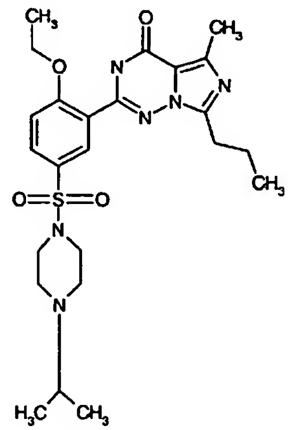
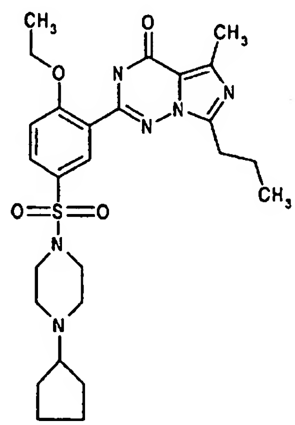
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
119		535.6675	93	536
120		517.6522	71	518
121		561.7058	92	562

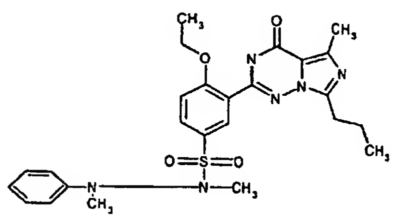
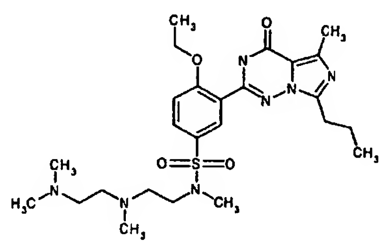
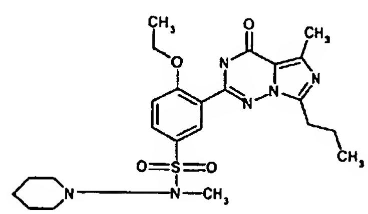
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
122		539.6586	85	540
123		518.6834	87	519
124		588.1307	30	588

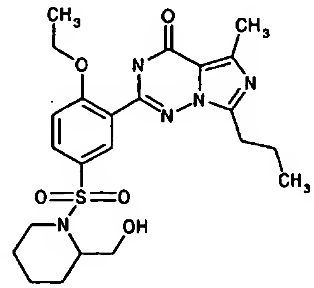
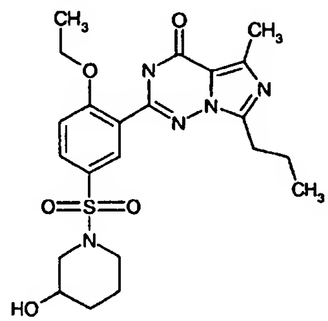
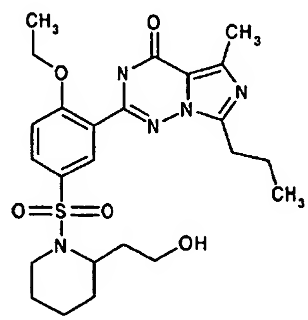
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
125		550.685	83	551
126		542.7057	77	543
127		502.6404	91	503

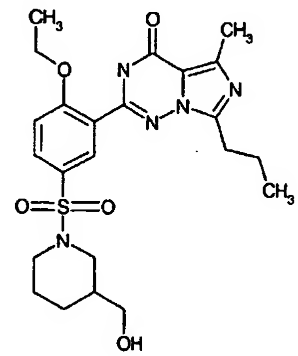
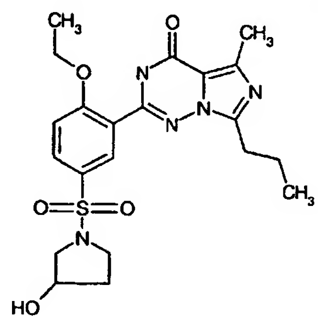
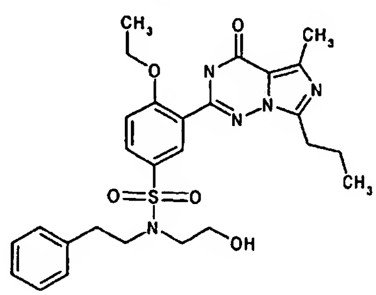
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
128		490.6292	45	491
129		568.7003	66	569
130		534.6828	86	535

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
131		580.7551	95	581
132		576.7205	87	577
133		598.7296	60	599

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
134		516.6675	95	517
135		528.6786	80	529

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
136		538.6738	85	539
137		533.6981	68	534
138		516.6675	91	517

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
139		489.598	85	490
140		475.5709	83	476
141		503.6251	85	504

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
142		489.598	91	490
143		461.5438	78	462
144		539.6586	88	540

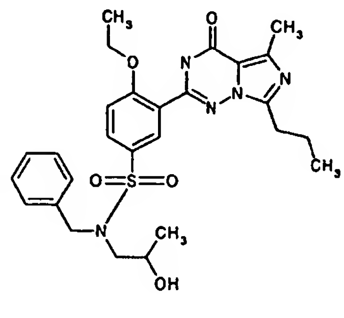
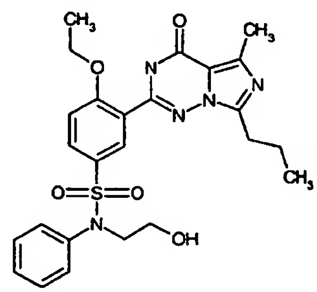
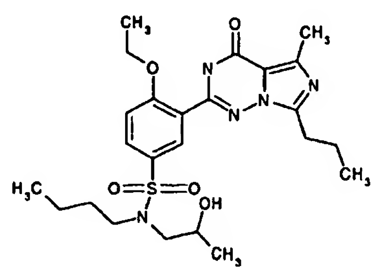
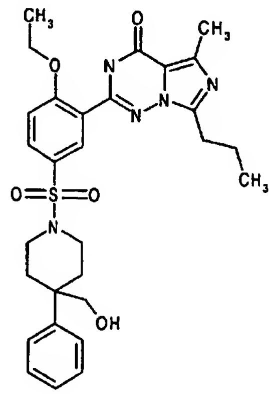
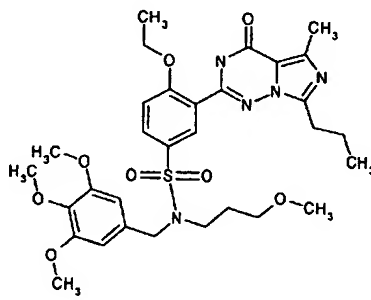
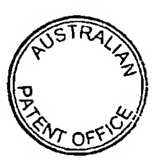
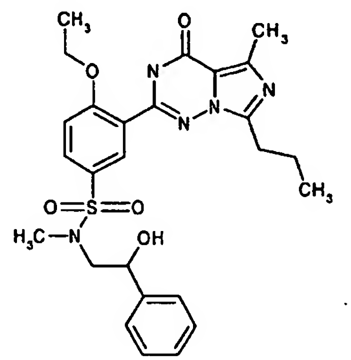
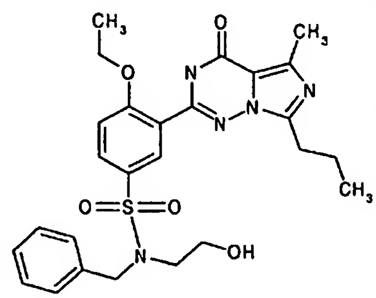
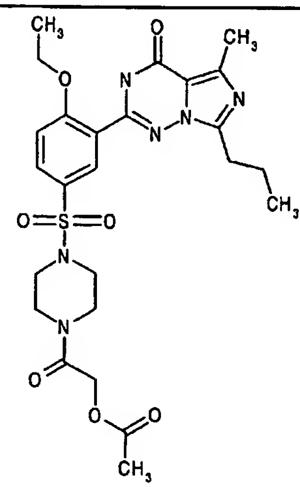
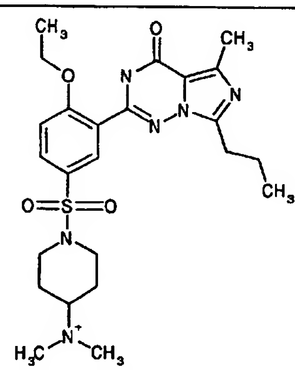
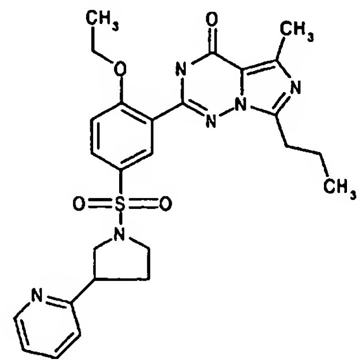
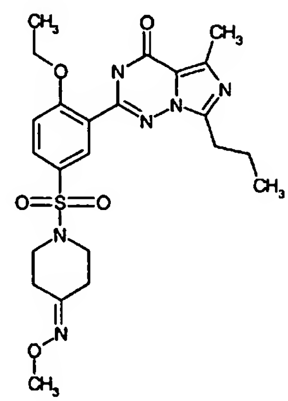
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
145		539.6586	58	538
146		511.6044	80	512
147		505.6411	90	506

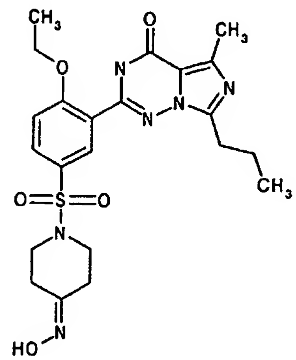
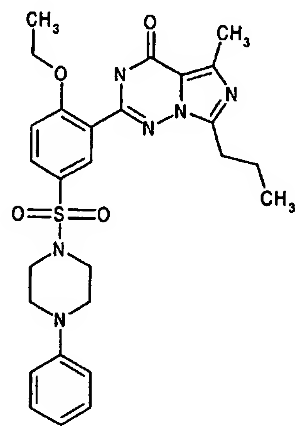
Table 3:				
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
148		565.70	38	566
149		643.77	85	644

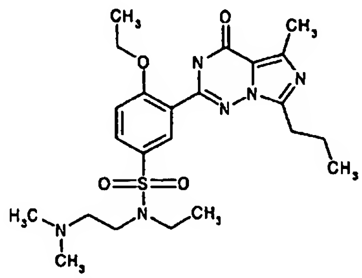
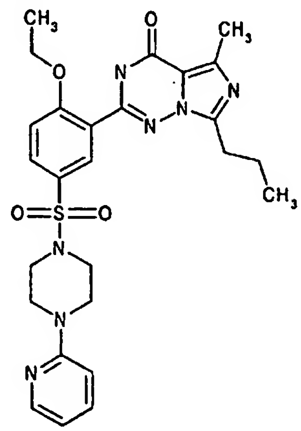


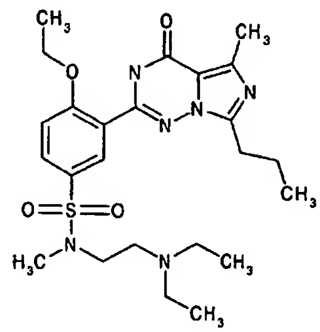
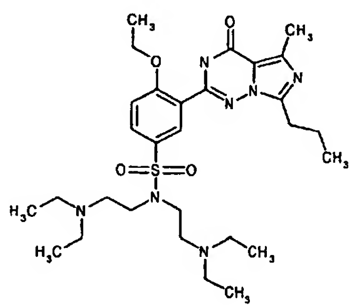
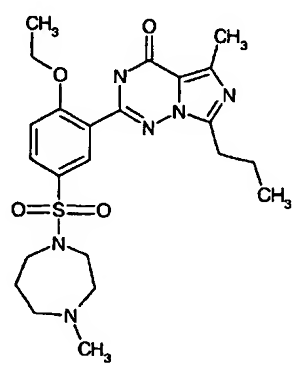
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
150		525.63	80	526
151		525.63	78	526

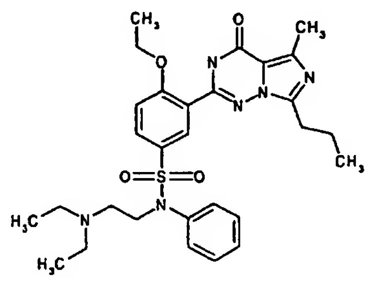
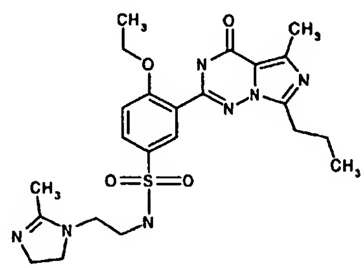
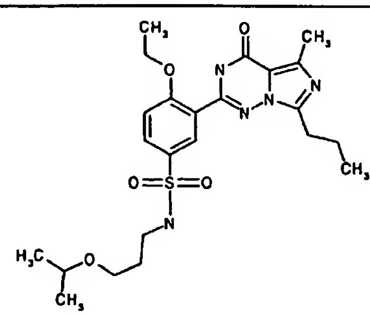
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
152		560.63	51	561
153		503.65	78	504

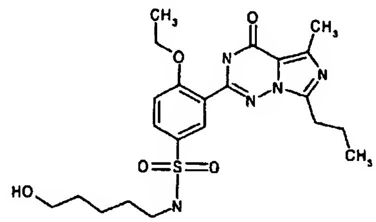
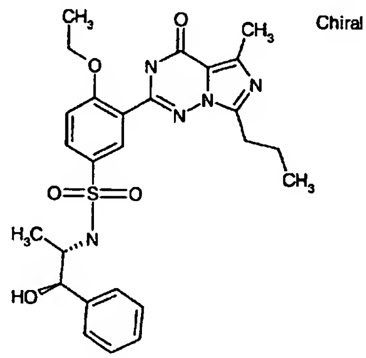
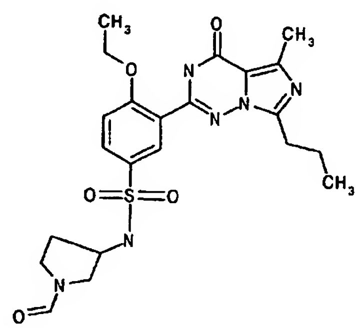
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
154		522.63	82	523
155		502.60	84	503

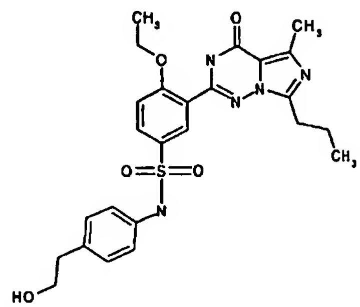
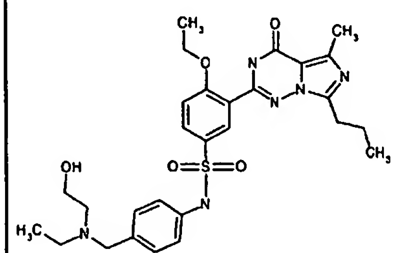
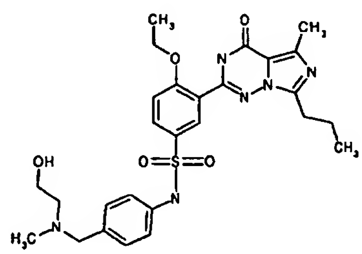
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
156		488.57	83	489
157		536.66	82	537

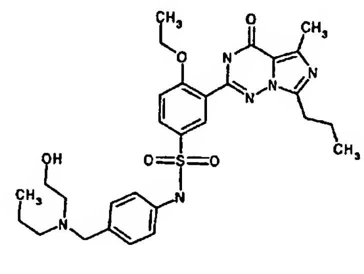
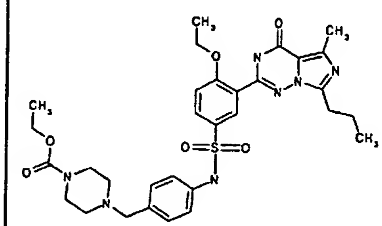
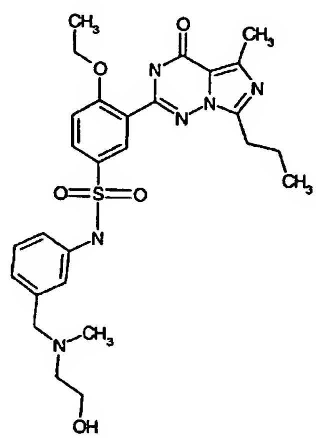
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
158		490.63	90	491
159		537.65	83	538

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
160		504.66	91	505
161		589.81	65	590
162		488.61	88	489

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
163		566.73	32	567
164		501.61	75	502
165		491.61	91	492

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
166		477.59	73	478
167		525.63	81	526
168		488.57	70	489

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
169		511.60	76	512
170		568.70	50	569
171		554.67	63	555

Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
172		582.73	50	583
173		637.76	30	638
174		554.67	70	555

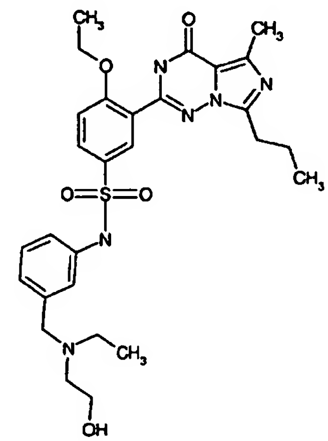
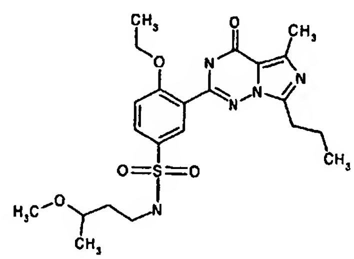
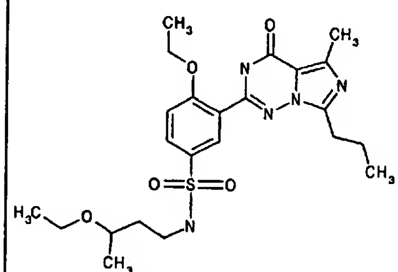
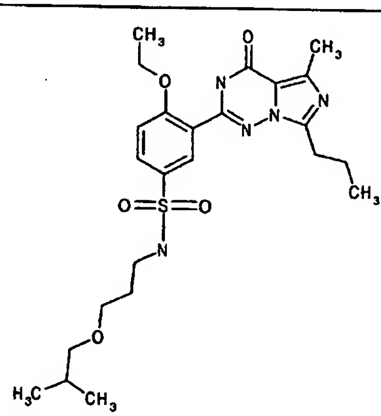
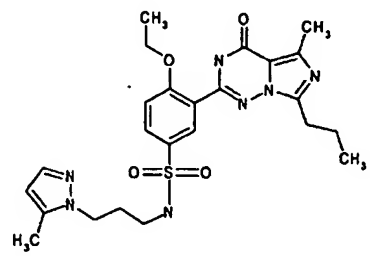
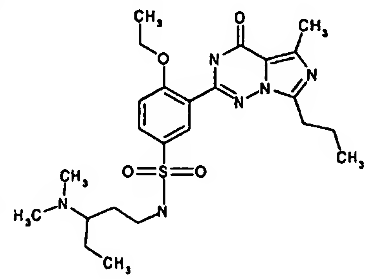
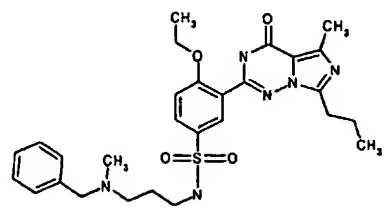
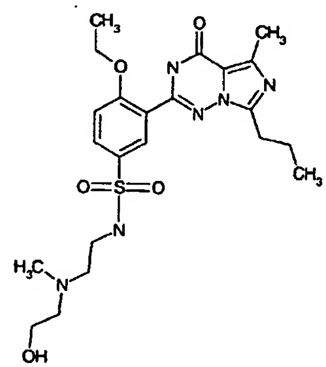
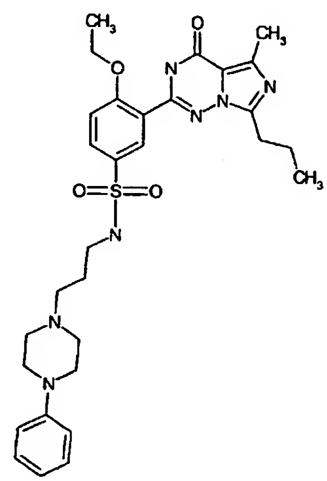
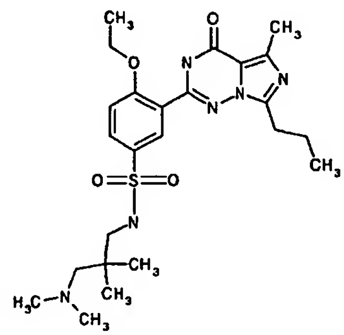
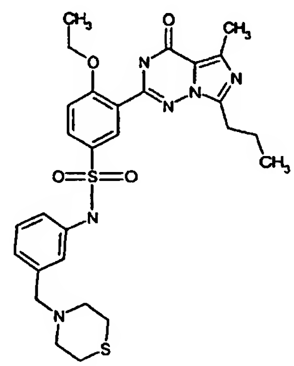
Ex. No.	Structure	MW [g/mol]	HPLC	MZ + H
175		568.70	44	569

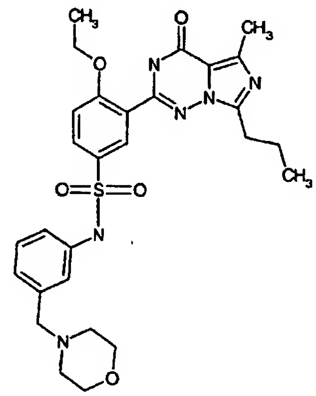
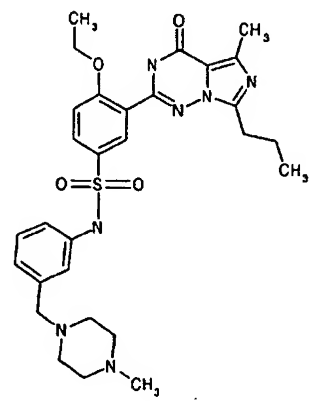
Table 4:

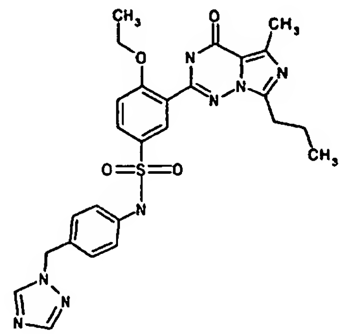
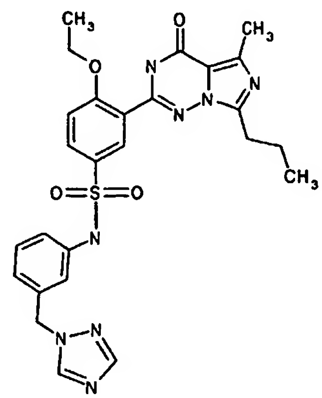
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
176		477.59	82	478
177		491.61	89	492
178		505.64	88	506

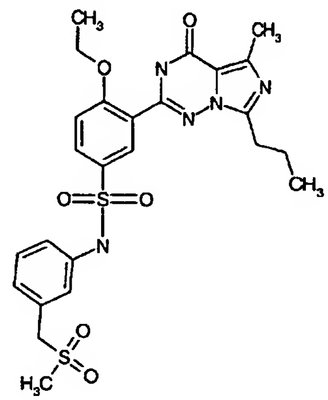
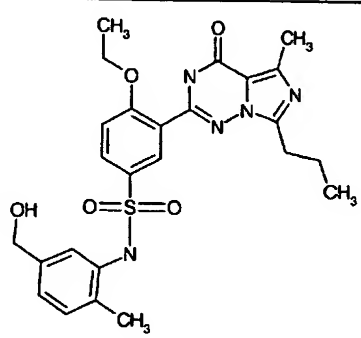
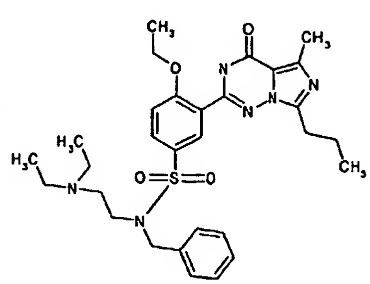
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
179		513.62	47	514
180		504.66	83	505
181		552.70	83	553

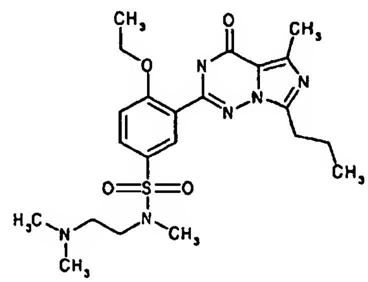
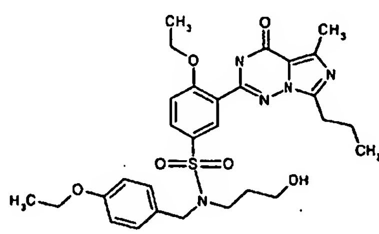
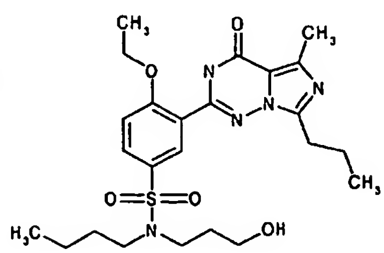
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
182		492.60	72	493
183		593.75	52	594

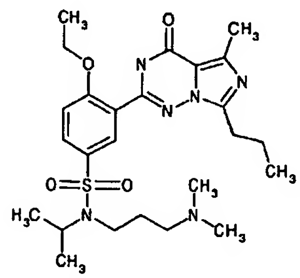
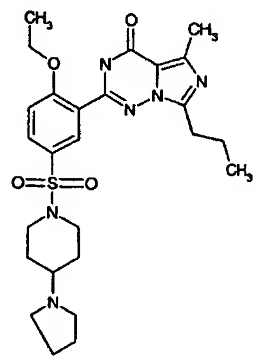
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
184		504.66	82	505
185		582.75	59	583

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
186		566.68	60	567
187		579.73	30	580

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
188		548.63	73	549
189		548.63	72	549

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
190		559.67	54	560
191		511.60	70	512
192		580.76	68	581

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
193		476.60	89	477
194		583.71	80	584
195		505.64	84	506

Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
196		518.68	40	519
197		528.68	82 ?	529

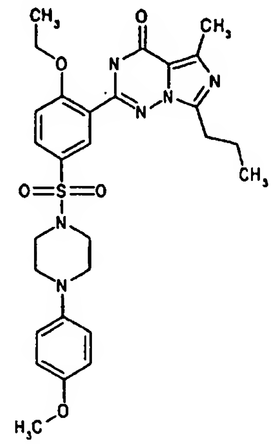
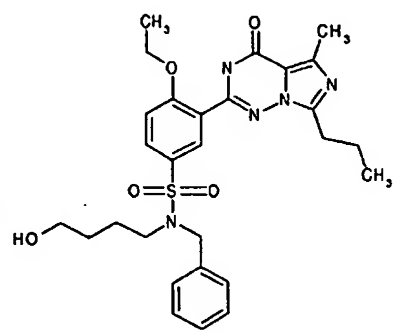
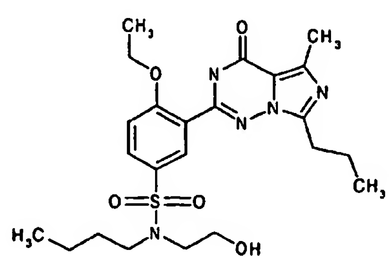
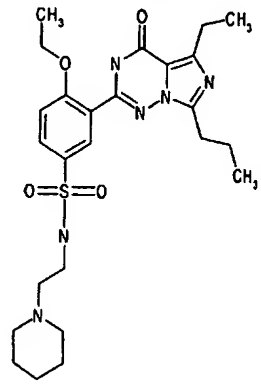
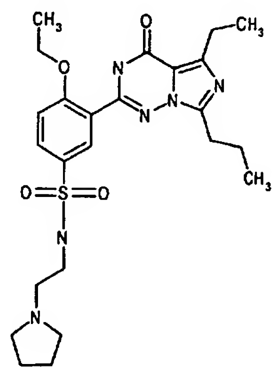
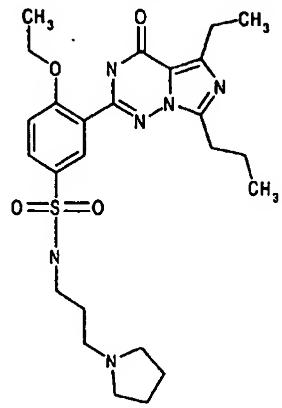
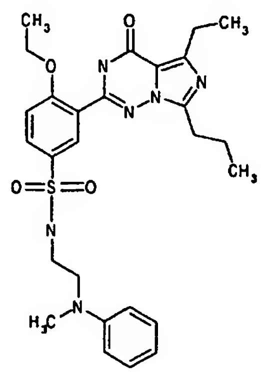
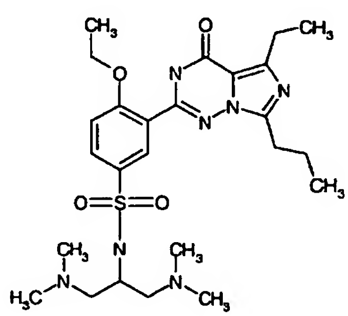
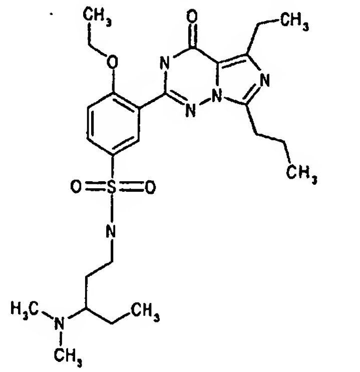
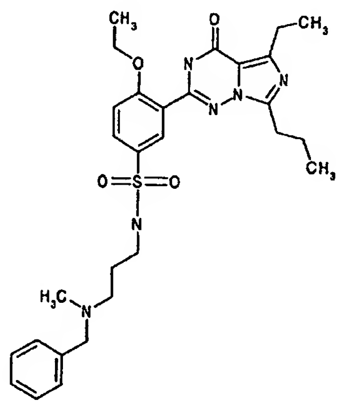
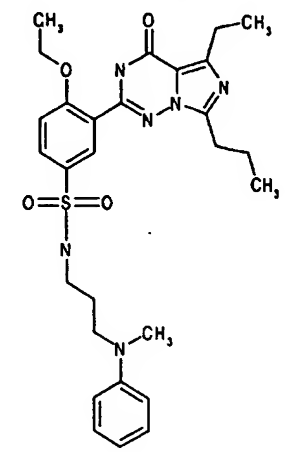
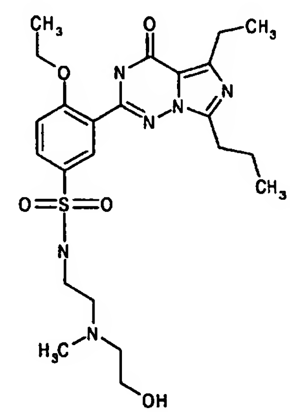
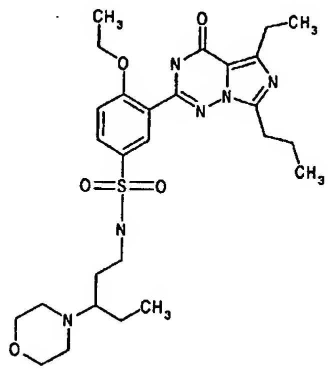
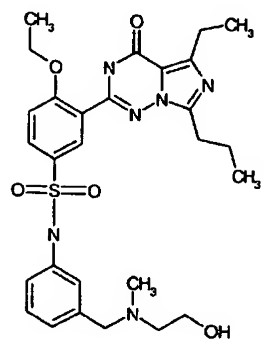
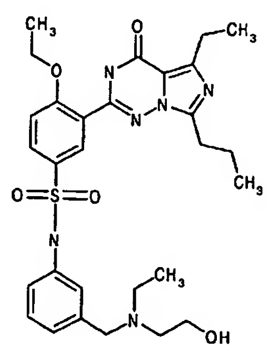
Ex. No.	Structure	MW [g/mol]	HPLC	MZ+H
198		566.68	63	567
199		553.69	87	554
200		491.61	84	492

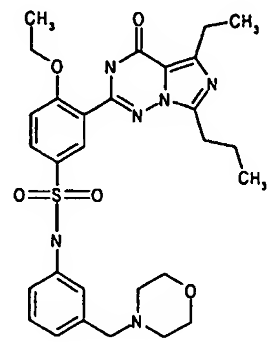
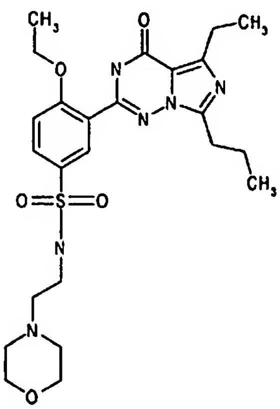
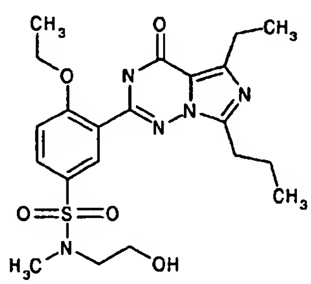
Table 5				
Ex. No.	Structure	MW	HPLC	MZ+H
201		516.67	87	517
202		502.64	84	503

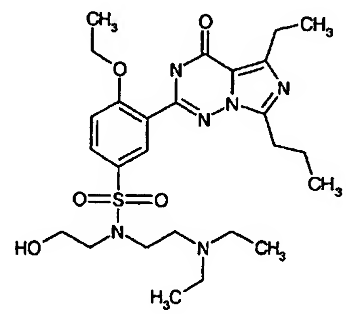
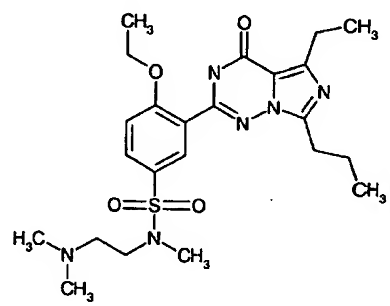
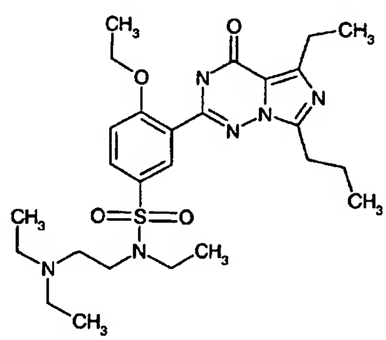
Ex. No.	Structure	MW	HPLC	MZ+H
203		516.67	87	517
204		538.67	91	539
205		533.7	85	534

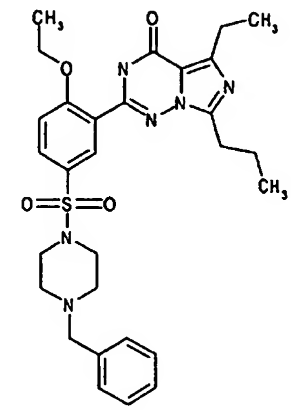
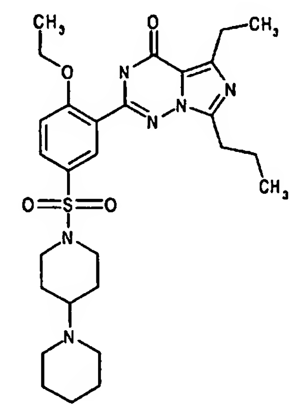
Ex. No.	Structure	MW	HPLC	MZ+H
206		518.68	77	519
207		566.73	92	567

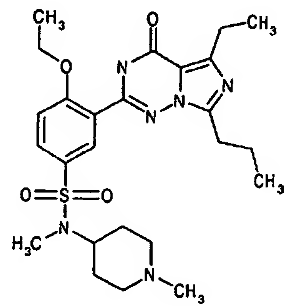
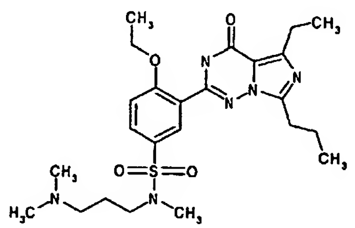
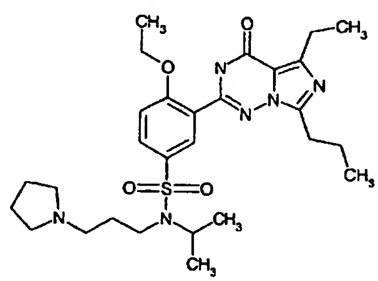
Ex. No.	Structure	MW	HPLC	MZ+H
208		552.7	87	553
209		506.63	52	507

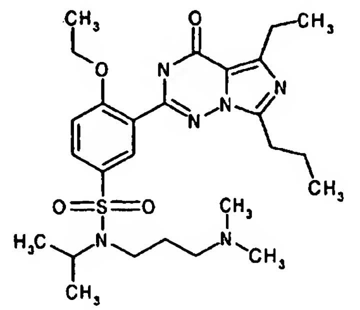
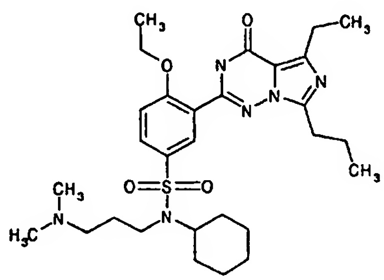
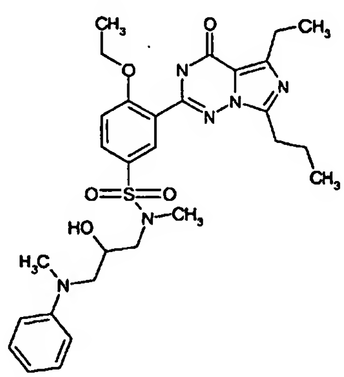
Ex. No.	Structure	MW	HPLC	MZ+H
210		560.72	62	561
211		568.7	88	569
212		582.73	89	583

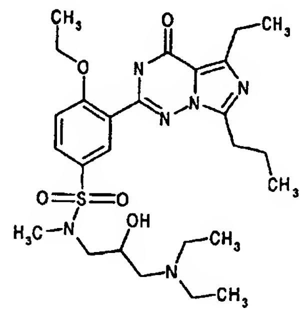
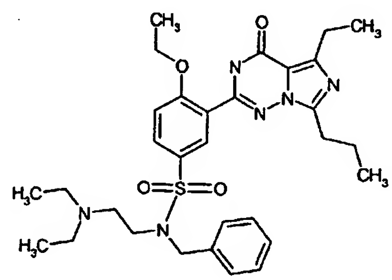
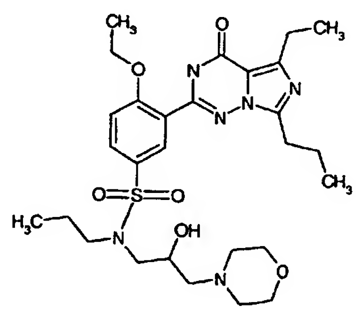
Ex. No.	Structure	MW	HPLC	MZ+H
213		580.71	83	581
214		518.64	89	519
215		463.56	90	464

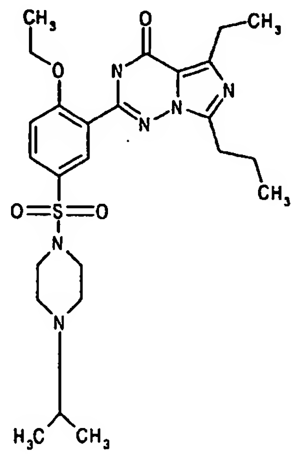
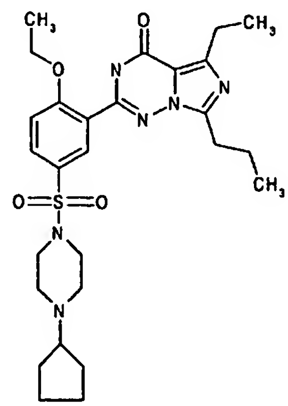
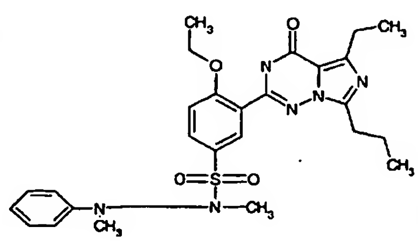
Ex. No.	Structure	MW	HPLC	MZ+H
216		548.71	78	549
217		490.63	87	491
218		532.71	93	533

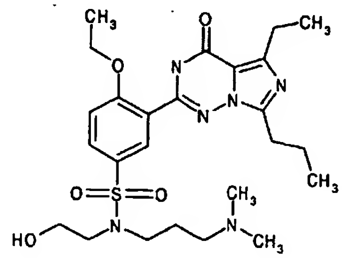
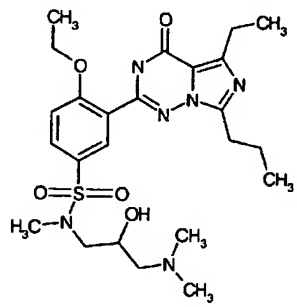
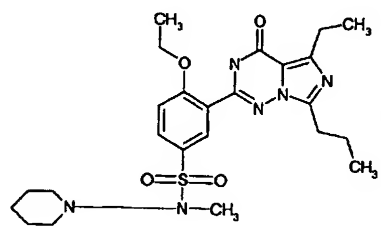
Ex. No.	Structure	MW	HPLC	MZ+H
219		564.71	91	565
220		556.73	92	557

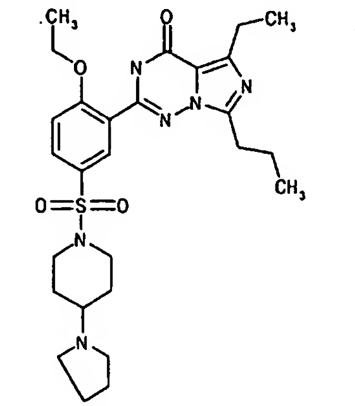
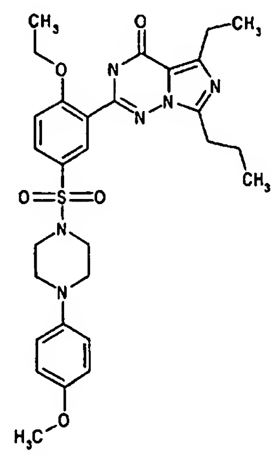
Ex. No.	Structure	MW	HPLC	MZ+H
221		516.67	92	517
222		504.66	83	505
223		558.75	90	559

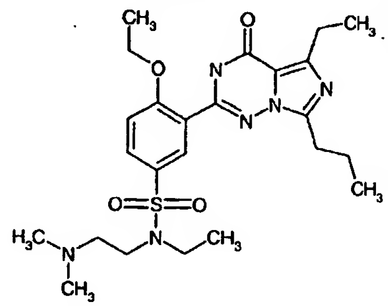
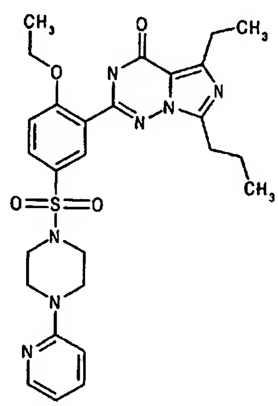
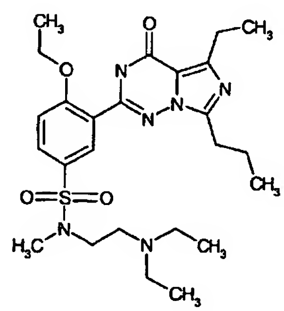
Ex. No.	Structure	MW	HPLC	MZ+H
224		532.71	86	533
225		572.78	68	573
226		582.73	87	583

Ex. No.	Structure	MW	HPLC	MZ+H
227		548.71	85	549
228		594.78	97	595
229		590.75	90	591

Ex. No.	Structure	MW	HPLC	MZ+H
230		530.69	95	531
231		542.71	88	543
232		552.7	91	553

Ex. No.	Structure	MW	HPLC	MZ+H
233		534.68	65	535
234		520.66	83	521
235		530.69	89	531

Ex. No.	Structure	MW	HPLC	MZ+H
236		542.71	70	543
237		580.71	81	581

Ex. No.	Structure	MW	HPLC	MZ+H
238		504.66	81	505
239		551.67	86	552
240		518.68	85	519

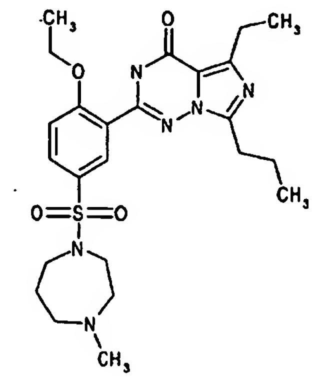
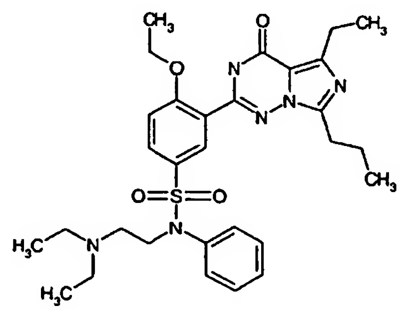
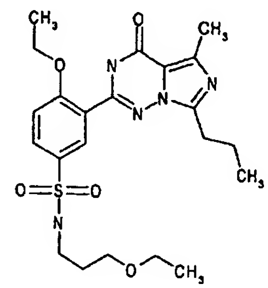
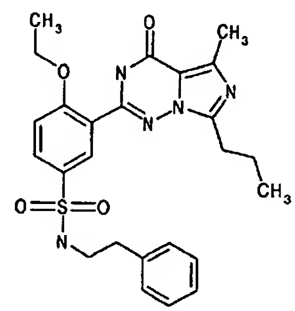
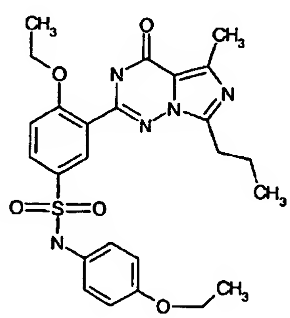
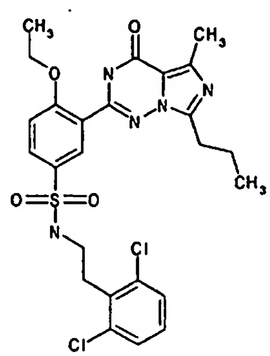
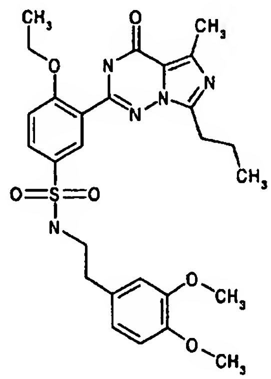
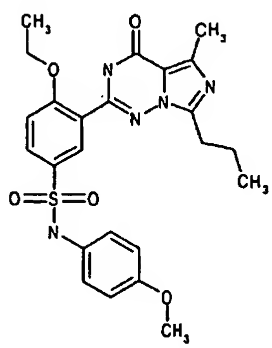
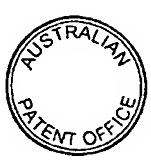
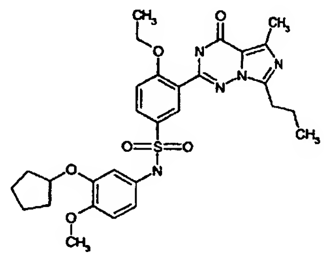
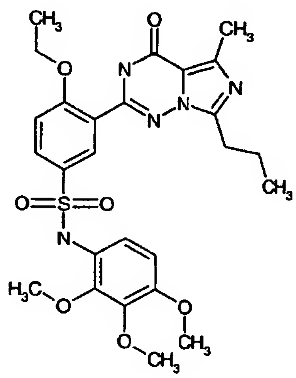
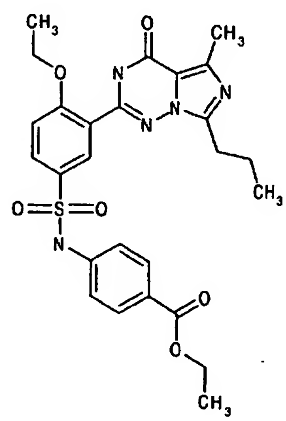
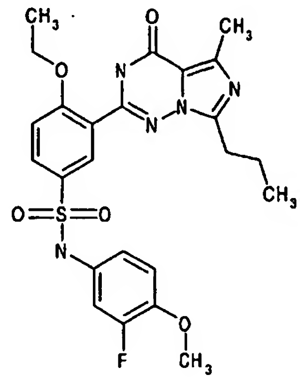
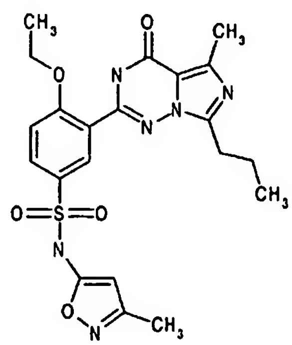
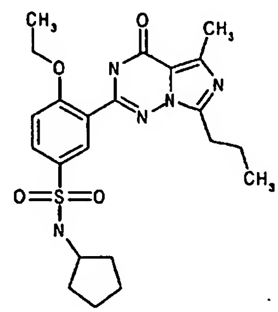
Ex. No.	Structure	MW	HPLC	MZ+H
241		502.64	85	503
242		580.76	79	581

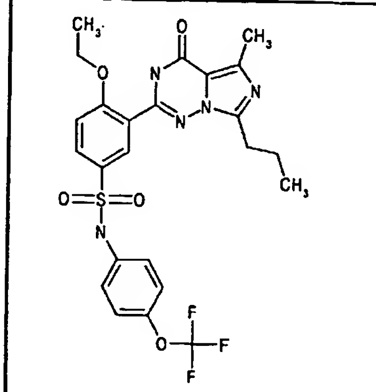
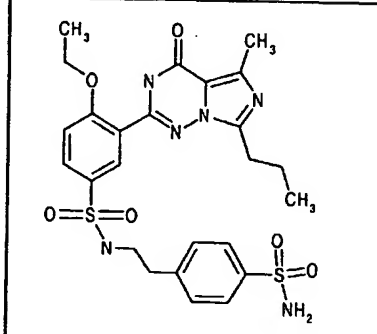
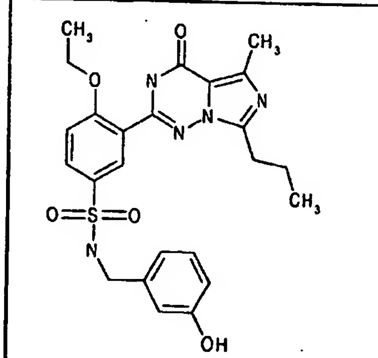
Table 6				
Ex. No.	Structure	MW	HPLC	MZ+H
243		477.5869	86	478
244		495.605	62	496
245		511.6044	50	512

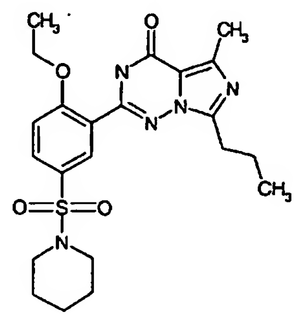
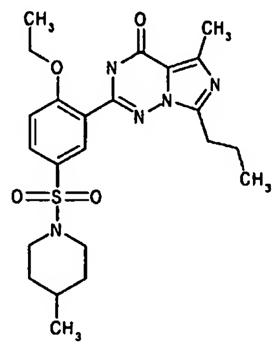
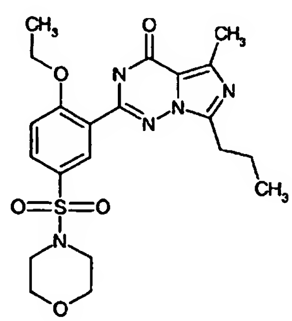
Ex. No.	Structure	MW	HPLC	MZ+H
246		564.495	40	565
247		555.658	61	556
248		497.5773	60	498

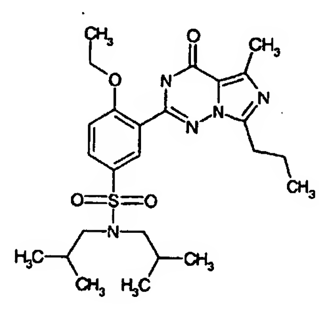
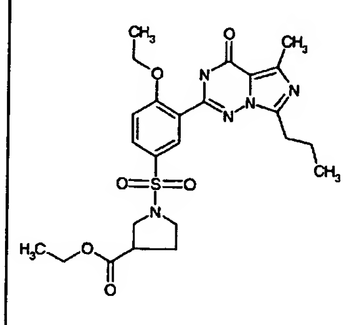
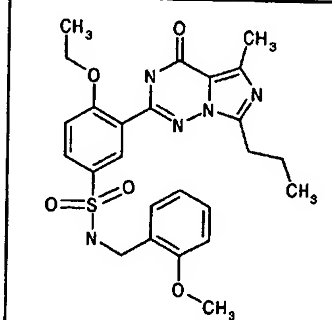


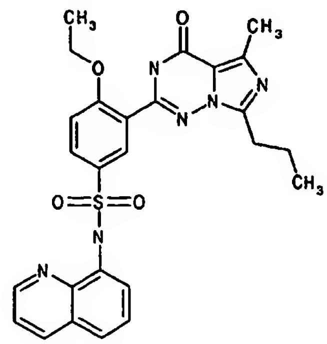
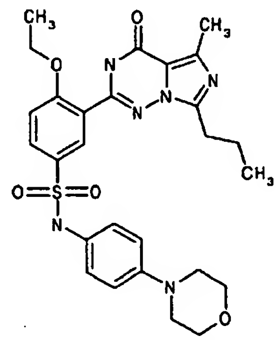
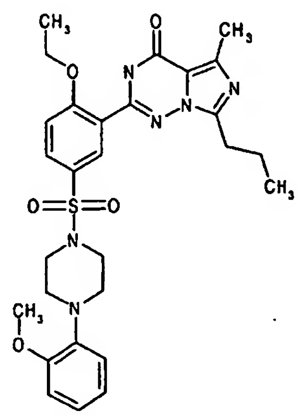
Ex. No.	Structure	MW	HPLC	MZ+H
249		581.6963	77	582
250		557.6303	76	558
251		539.615	74	540

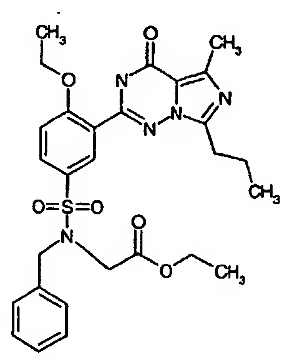
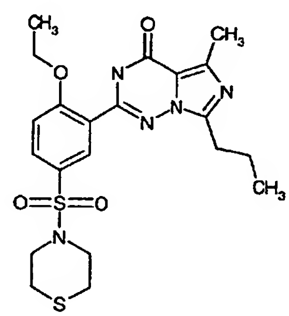
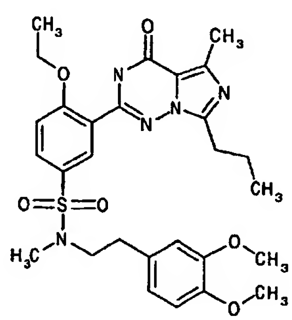
Ex. No.	Structure	MW	HPLC	MZ+H
252		515.5677	64	516
253		472.5266	38	473
254		459.5715	88	460

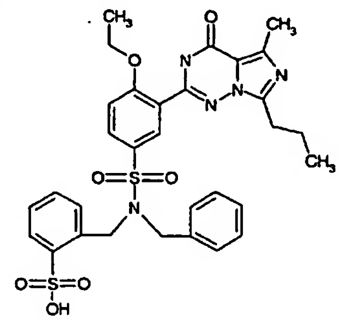
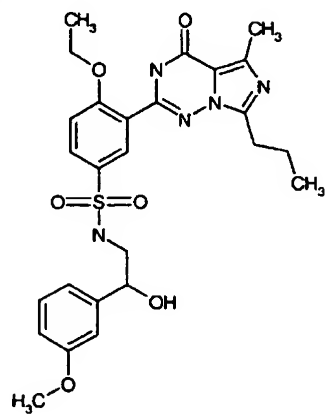
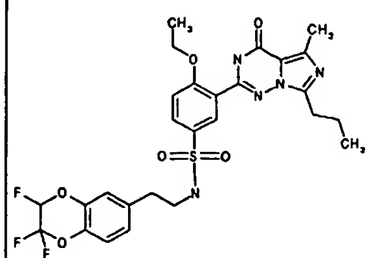
Ex. No.	Structure	MW	HPLC	MZ+H
255		551.5486	78	552
256		574.6824	59	575
257		497.5773	40	498

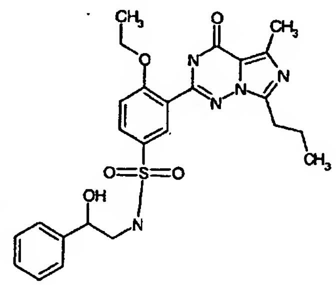
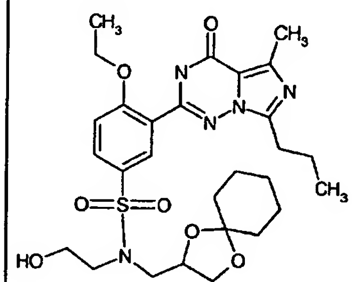
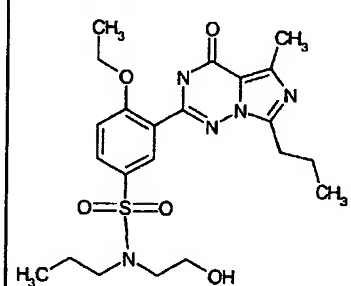
Ex. No.	Structure	MW	HPLC	MZ+H
258		459.5715	90	460
259		473.5986	80	474
260		461.5439	83	462

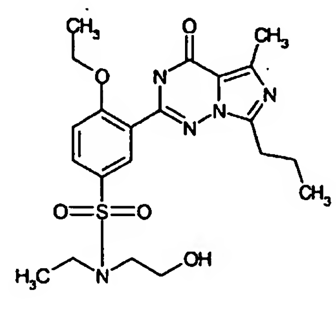
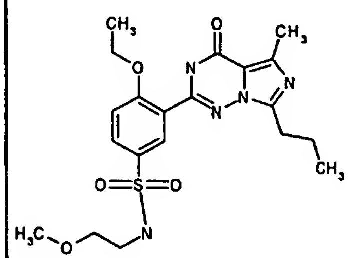
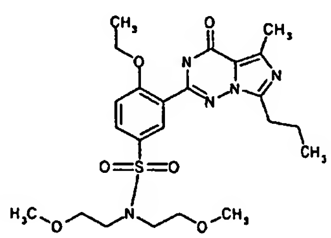
Ex. No.	Structure	MW	HPLC	MZ+H
261		503.6687	71	504
262		517.6086	71	518
263		511.6044	76	512

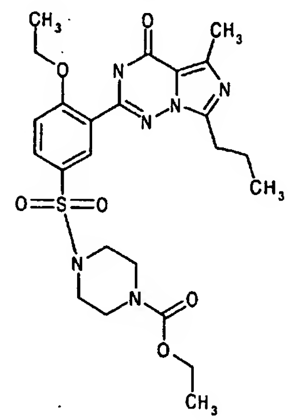
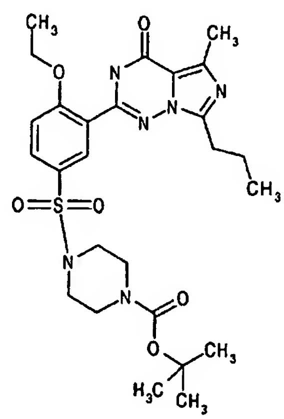
Ex. No.	Structure	MW	HPLC	MZ+H
264		518.5989	74	519
265		552.6573	91	553
266		566.6844	71	567

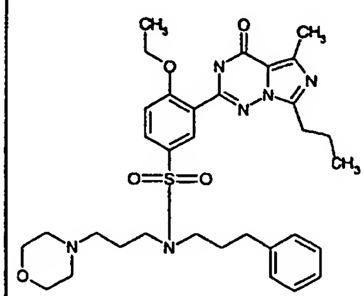
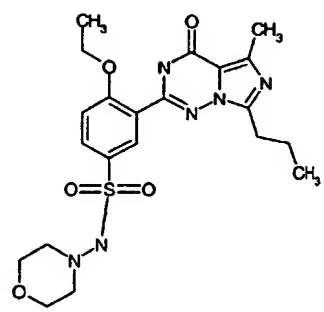
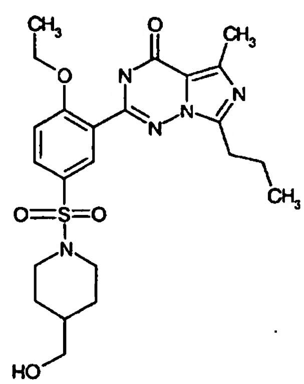
Ex. No.	Structure	MW	HPLC	MZ+H
267		567.6692	48	568
268		477.6084	90	478
269		569.6851	73	570

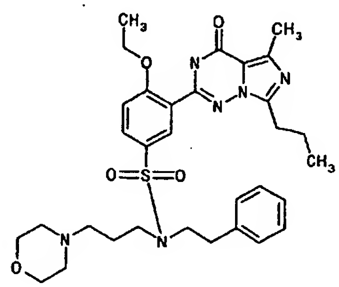
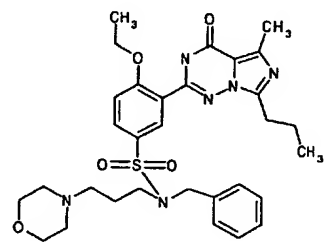
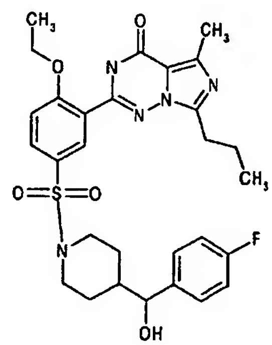
Ex. No.	Structure	MW	HPLC	MZ+H
270		651.766	65	652
271		541.6309	71	542
272		607.6133	39	608

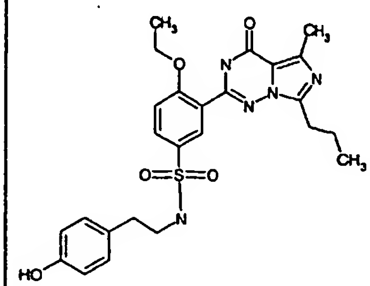
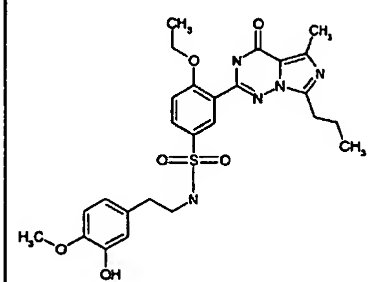
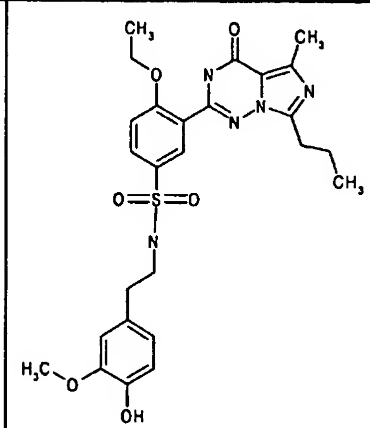
Ex. No.	Structure	MW	HPLC	MZ+H
273		511.6044	92	512
274		589.7164	>95	590
275		477.5869	>95	478

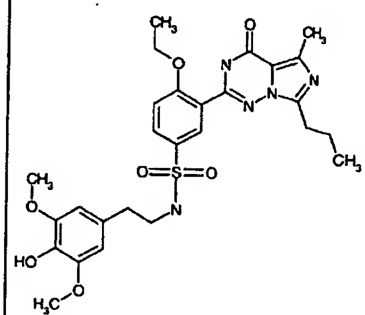
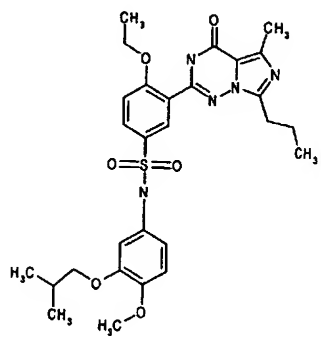
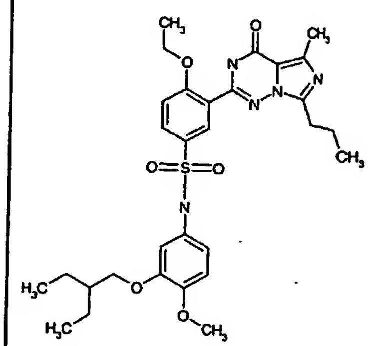
Ex. No.	Structure	MW	HPLC	MZ+H
276		463.5598	64	464
277		449.5327	>95	450
278		507.6134	>95	508

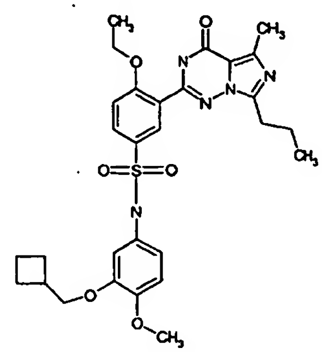
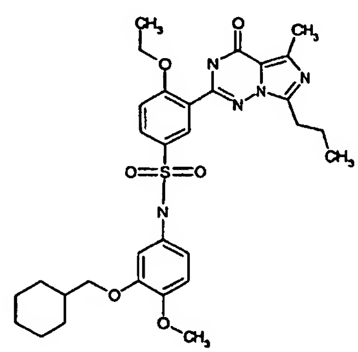
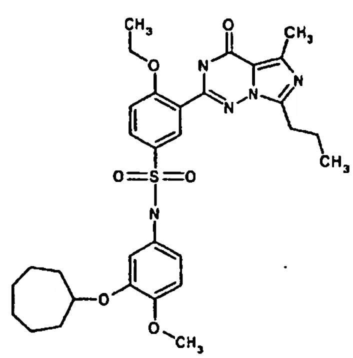
Ex. No.	Structure	MW	HPLC	MZ+H
279		532.6232	>95	533
280		560.6775	89	561

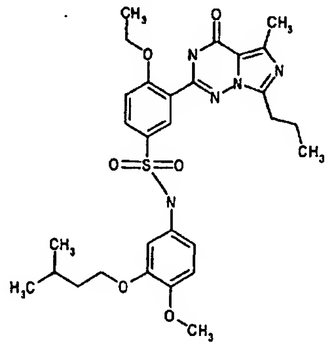
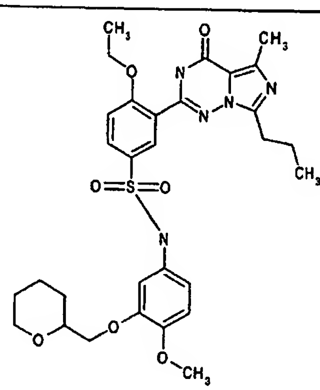
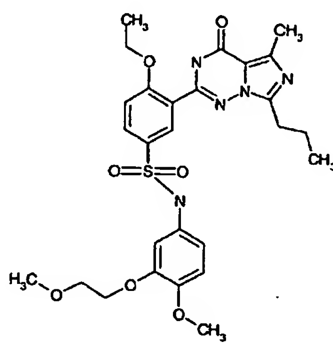
Ex. No.	Structure	MW	HPLC	MZ+H
281		636.8199	88	637
282		476.5585	50	477
283		489.5981	93	490

Ex. No.	Structure	MW	HPLC	MZ+H
284		622.7928	68	623
285		608.7657	>95	609
286		583.6873	85	584

Ex. No.	Structure	MW	HPLC	MZ+H
287		511.6044	>95	512
288		541.6309	>95	542
289		541.6309	>95	542

Ex. No.	Structure	MW	HPLC	MZ+H
290		571.6574	73	572
291		569.6851	83	570
292		597.7393	89	598

Ex. No.	Structure	MW	HPLC	MZ+H
293		581.6963	76	582
294		609.7504	83	610
295		609.7504	77	610

Ex. No.	Structure	MW	HPLC	MZ+H
296		583.7122	82	584
297		611.7227	88	612
298		571.6574	89	572

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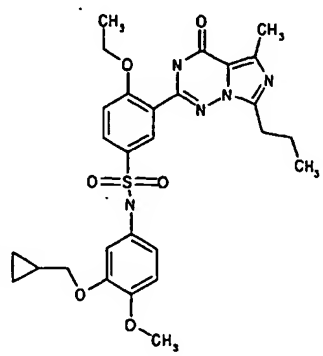
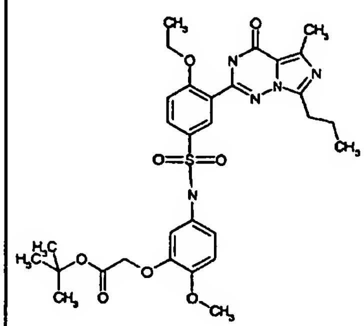
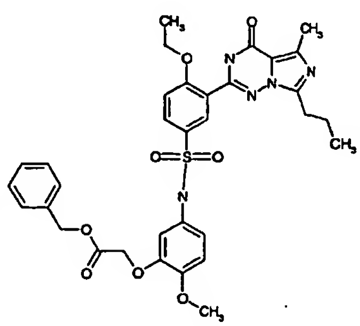
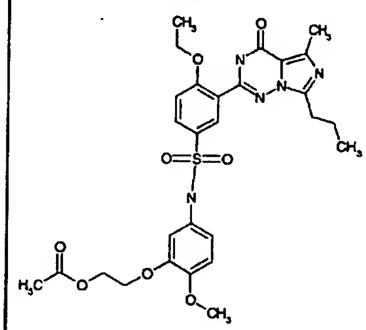
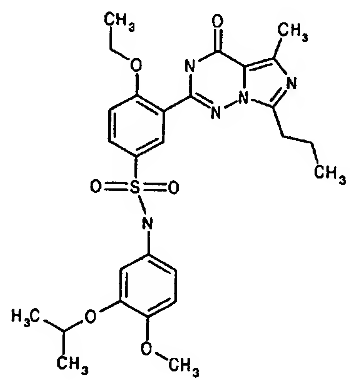
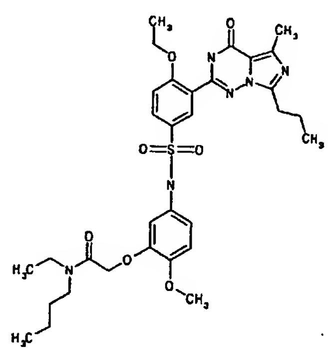
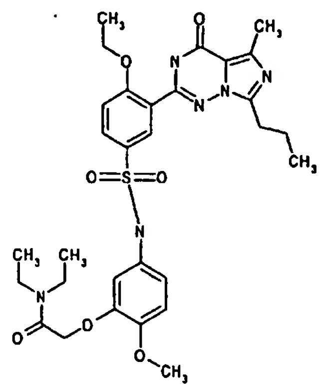
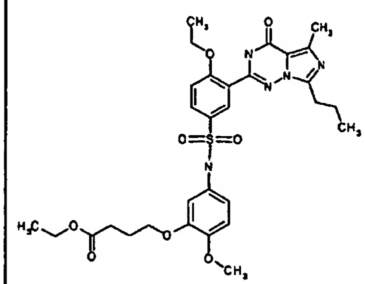
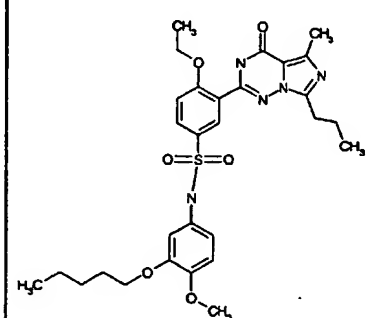
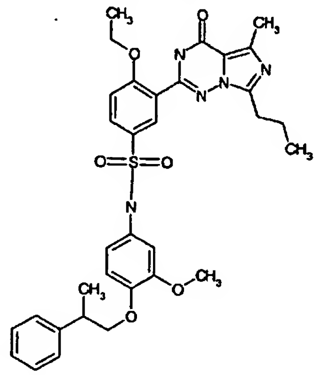
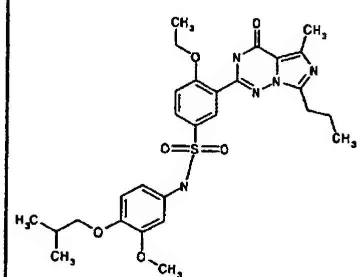
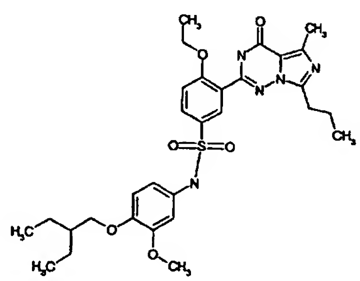
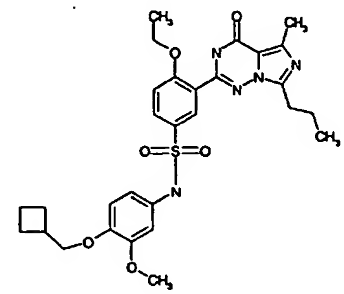
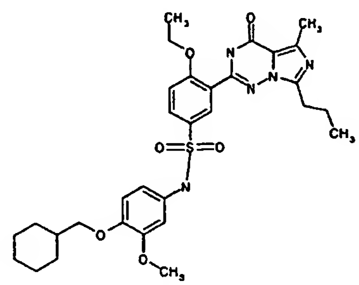
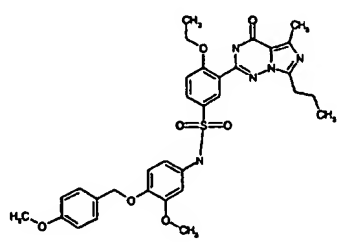
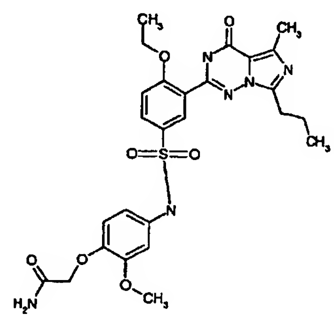
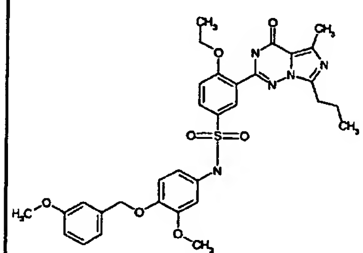
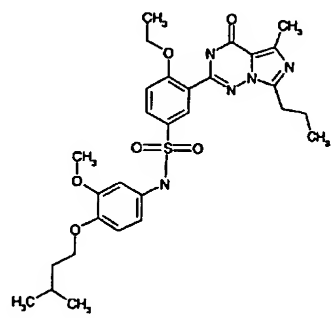
299		567.6692	81	568
300		627.7221	82	628
301		661.7396	64	662

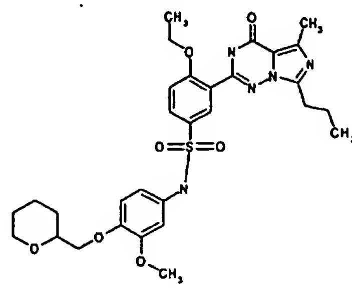
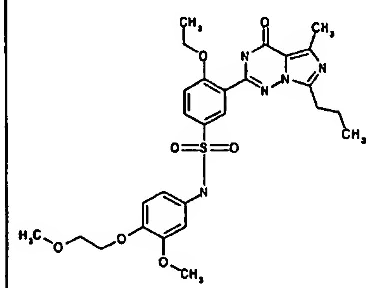
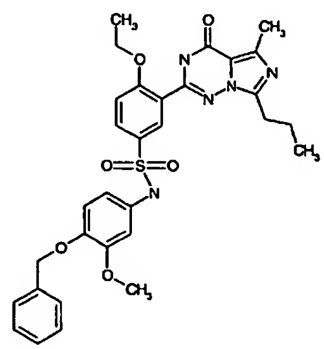
Ex. No.	Structure	MW	HPLC	MZ+H
302		599.668	77	600
303		555.658	83	556
304		654.7916	60	655

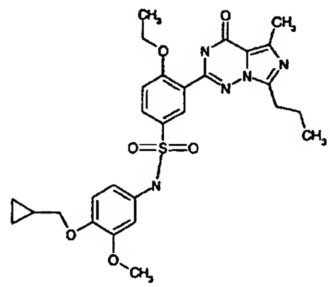
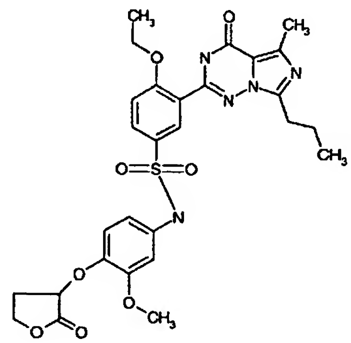
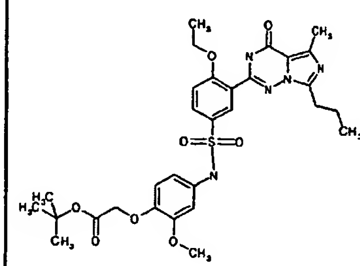
Ex. No.	Structure	MW	HPLC	MZ+H
305		626.7374	86	627
306		627.7221	82	628
307		583.7122	81	584

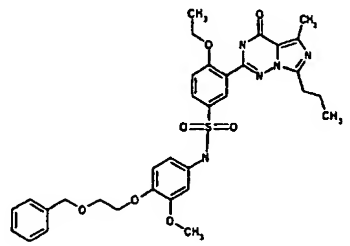
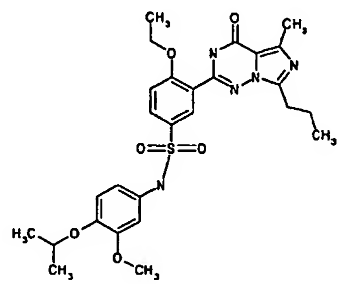
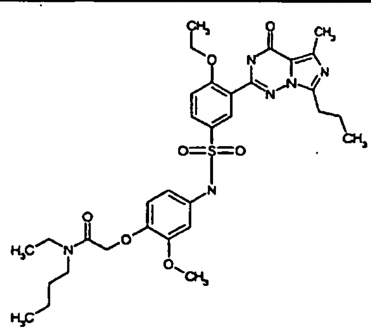
Ex. No.	Structure	MW	HPLC	MZ+H
308		631.7568	29	632
309		569.6851	60	570
310		597.7393	62	598

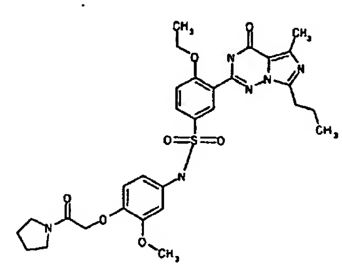
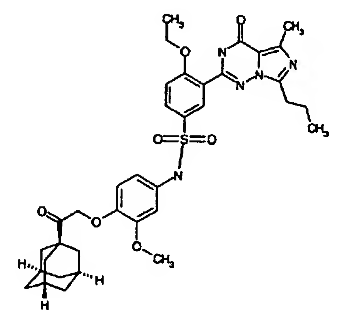
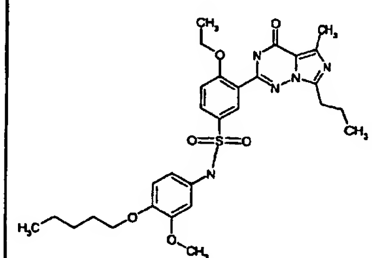
Ex. No.	Structure	MW	HPLC	MZ+H
311		581.6963	87	582
312		609.7504	71	610
313		633.7291	47	634

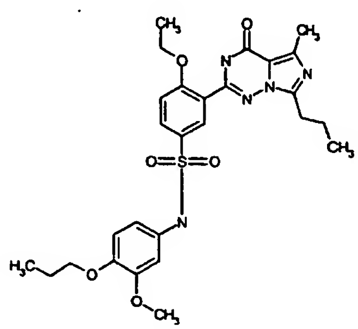
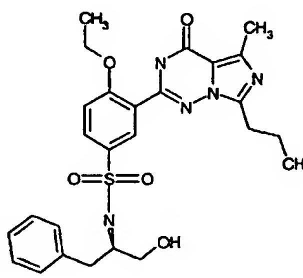
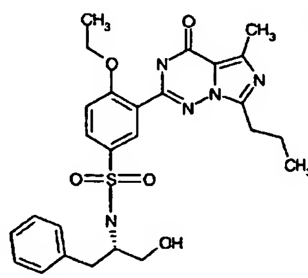
Ex. No.	Structure	MW	HPLC	MZ+H
314		570.629	59	571
315		633.7291	35	634
316		583.7122	51	584

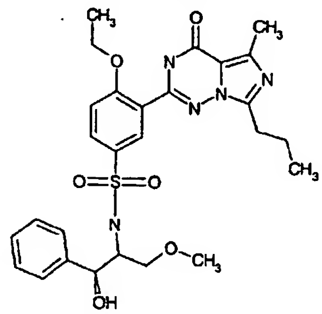
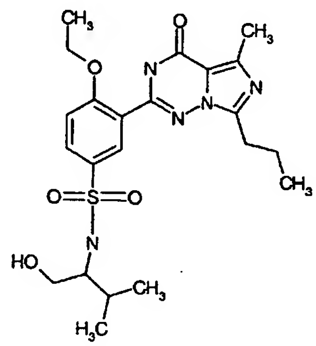
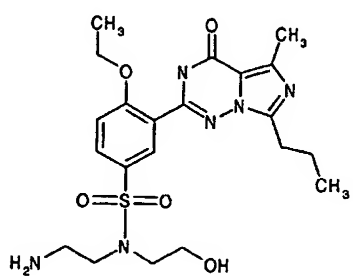
Ex. No.	Structure	MW	HPLC	MZ+H
317		611.7227	51	612
318		571.6574	75	572
319		603.7026	64	604

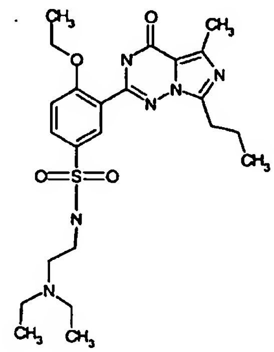
Ex. No.	Structure	MW	HPLC	MZ+H
320		567.6692	74	568
321		597.652	88	598
322		627.7221	80	628

Ex. No.	Structure	MW	HPLC	MZ+H
323		647.7562	47	648
324		555.658	43	556
325		654.7916	54	655

Ex. No.	Structure	MW	HPLC	MZ+H
326		624.7214	71	625
327		689.8375	42	690
328		583.7122	40	584

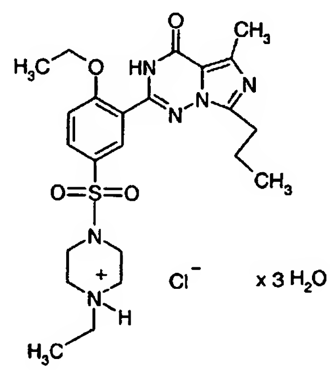
Ex. No.	Structure	MW	HPLC	MZ+H
329		555.658	49	556
330		525.6315	83	526
331		525.6315	71	526

Ex. No.	Structure	MW	HPLC	MZ+H
332		555.658	91	556
333		477.5869	76	478
334		478.5745	62	479

Ex. No.	Structure	MW	HPLC	MZ+H
335		490.6292	42	491

Example 336

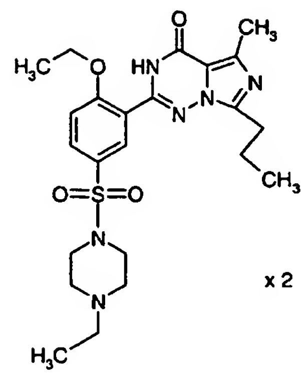
2-[2-Ethoxy-5-(4-ethyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3H-imidazol[5,1-f][1,2,4]triazine-4-one hydrochloride trihydrate



If the free base from Example 19 is crystallized from a mixture of an organic solvent and dilute aqueous hydrochloric acid, a hydrochloride trihydrate is obtained.
m.p.: 218°C
Water content: 9.4% (K. Fischer)
Chloride content: 6.1%

Example 337

2-[2-Ethoxy-5-(4-ethyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3H-imidazo[5,1-f][1,2,4]triazine-4-one dihydrochloride



x 2 HCl

0.35 g (0.712 mmol) of 2-[2-ethoxy-5-(4-ethyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3H-imidazo[5,1-f][1,2,4]triazine-4-one are suspended in 8 ml of ether and dichloromethane is added until a homogeneous solution is formed. 24 ml of a 1M solution of HCl in ether are added and the mixture is stirred at room temperature for 20 minutes and filtered off with suction. This gives 372 mg (99%) of 2-[2-ethoxy-5-(4-ethyl-piperazine-1-sulphonyl)-phenyl]-5-methyl-7-propyl-3H-imidazo[5,1-f][1,2,4]triazine-4-one dihydrochloride.

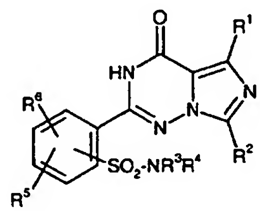
200 MHz ^{1}H-NMR (DMSO-d_6): 0.96, t, 3H; 1.22, t, 3H; 1.36, t, 3H; 1.82, sex., 2H; 2.61, s, 3H; 2.88, m, 2H; 3.08, m, 6H; 3.50, m, 2H; 3.70, m, 2H; 4.25, quart., 2H; 7.48, d, 1H; 7.95, m, 2H; 11.42, s, 1H; 12.45, s, 1H.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that that prior art forms part of the common general knowledge in Australia.

Patent claims

1. 2-Phenyl-substituted imidazotriazinones of the general formula (I)



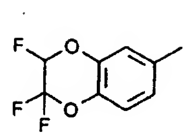
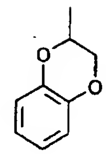
(I)

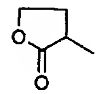
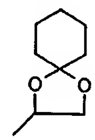
in which

R^1 represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

R^2 represents straight-chain alkyl having up to 4 carbon atoms,

R^3 and R^4 are identical or different and each represents hydrogen or represents straight-chain or branched alkenyl or alkoxy having in each case up to 8 carbon atoms, or
represents a straight-chain or branched alkyl chain having up to 10 carbon atoms which is optionally interrupted by an oxygen atom and which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of trifluoromethyl, trifluoromethoxy, hydroxyl, halogen, carboxyl, benzyloxycarbonyl, straight-chain or branched alkoxycarbonyl having up to 6 carbon atoms and/or by radicals of the formulae $-SO_3H$, $-(A)_a-NR^7R^8$, $-O-CO-NR^{7'}R^{8'}$, $-S(O)_b-R^9$, $-P(O)(OR^{10})(OR^{11})$,

 ,  ,

 and/or 

in which

a and b are identical or different and each represents a number 0 or 1,

A represents a radical CO or SO_2,

R^7, $R^{7'}$, R^8 and $R^{8'}$ are identical or different and each represents hydrogen, or

represents cycloalkyl having 3 to 8 carbon atoms, aryl having 6 to 10 carbon atoms, a 5- to 6-membered unsaturated, partially unsaturated or saturated, optionally benzo-fused heterocycle having up to 3 heteroatoms from the group consisting of S, N and O, where the abovementioned ring systems are optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, nitro, trifluoromethyl, trifluoromethoxy, carboxyl, halogen, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms or by a group of the formula $-(SO_2)_c-NR^{12}R^{13}$,

in which

c represents a number 0 or 1,

R^{12} and R^{13} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 5 carbon atoms,

or

R^7, $R^{7'}$, R^8 and $R^{8'}$ each represent straight-chain or branched alkoxy having up to 6 carbon atoms, or

represents straight-chain or branched alkyl having up to 8 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, halogen, aryl having 6 to 10 carbon atoms, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms or by a group of the formula $-(CO)_d-NR^{14}R^{15}$,

in which

R^{14} and R^{15} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

and

d represents a number 0 or 1,

or

R^7 and R^8 and/or $R^{7'}$ and $R^{8'}$ together with the nitrogen atom form a 5- to 7-membered saturated heterocycle which may optionally contain a

further heteroatom from the group consisting of S and O or a radical of the formula $-NR^{16}$,

in which

R^{16} represents hydrogen, aryl having 6 to 10 carbon atoms, benzyl, a 5- to 7-membered aromatic or saturated heterocycle having up to 3 heteroatoms from the group consisting of S, N and O which is optionally substituted by methyl, or
represents straight-chain or branched alkyl having up to 6 carbon atoms which is optionally substituted by hydroxyl,

R^9 represents aryl having 6 to 10 carbon atoms, or
represents straight-chain or branched alkyl having up to 4 carbon atoms,

R^{10} and R^{11} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

and/or the alkyl chain listed above under R^3/R^4 is optionally substituted by cycloalkyl having 3 to 8 carbon atoms, aryl having 6 to 10 carbon atoms or by a 5- to 7-membered partially unsaturated, saturated or unsaturated, optionally benzo-fused heterocycle which may contain up to 4 heteroatoms from the group consisting of S, N and O or a radical of the formula $-NR^{17}$,

in which

R^{17} represents hydrogen, hydroxyl, formyl, trifluoromethyl, straight-chain or branched acyl or alkoxy having in each case up to 4 carbon atoms,

or represents straight-chain or branched alkyl having up to 6 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl and straight-chain or branched alkoxy having up to 6 carbon atoms,

and where aryl and the heterocycle are optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of nitro, halogen, $-SO_3H$, straight-chain or branched alkyl or alkoxy having in each case up to 6 carbon atoms, hydroxyl, trifluoromethyl, trifluoromethoxy and/or by a radical of the formula $-SO_2-NR^{18}R^{19}$,

in which

R^{18} and R^{19} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 6 carbon atoms,

and/or

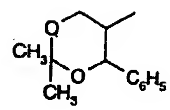
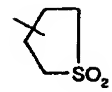
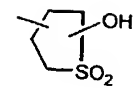
R^3 or R^4 represents a group of the formula $-NR^{20}R^{21}$,

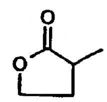
in which

R^{20} and R^{21} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

and/or

R^3 or R^4 represents adamantyl, or represents radicals of the formulae

 ,  , 

or  ,

or represents cycloalkyl having 3 to 8 carbon atoms, aryl having 6 to 10 carbon atoms or represents a 5- to 7-membered partially unsaturated, saturated or unsaturated, optionally benzo-fused heterocycle which may contain up to 4 heteroatoms from the group consisting of S, N and O, or a radical of the formula $-NR^{22}$,

in which

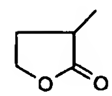
R^{22} has the meaning of R^{16} given above and is identical to or different from it, or
represents carboxyl, formyl or straight-chain or branched acyl having up to 5 carbon atoms,

and where cycloalkyl, aryl and/or the heterocycle are optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of halogen, triazolyl, trifluoromethyl, trifluoromethoxy, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 6 carbon atoms, nitro and/or by groups of the formulae $-SO_3H$, $-OR^{23}$, $(SO_2)_cNR^{24}R^{25}$, $-P(O)(OR^{26})(OR^{27})$,

in which

e represents a number 0 or 1,

R^{23} represents a radical of the formula

 or

represents cycloalkyl having 3 to 7 carbon atoms, or
represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms which is optionally substituted by cycloalkyl having 3 to 7 carbon atoms, benzyloxy, tetrahydropyranyl, tetrahydrofuranyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms, carboxyl, benzyloxycarbonyl or phenyl which for its part may be mono- or polysubstituted by identical or different substituents selected from the group consisting of straight-chain or branched alkoxy having up to 4 carbon atoms, hydroxyl and halogen,

and/or alkyl which is optionally substituted by radicals of the formulae $-CO-NR^{28}R^{29}$ or $-CO-R^{30}$,

in which

R^{28} and R^{29} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 8 carbon atoms, or

R^{28} and R^{29} together with the nitrogen atom form a 5- to 7-membered saturated heterocycle which may optionally contain a further heteroatom from the group consisting of S and O,

and

R^{30} represents phenyl or adamantyl,

R^{24} and R^{25} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

R^{26} and R^{27} have the meanings of R^{10} and R^{11} given above and are identical to or different from them

and/or cycloalkyl, aryl and/or the heterocycle are optionally substituted by straight-chain or branched alkyl having up to 6 carbon atoms which is optionally substituted by hydroxyl, carboxyl, by a 5- to 7-membered heterocycle having up to 3 heteroatoms from the group consisting of S, N and O, or by groups of the formula $-SO_2-R^{31}$, $P(O)(OR^{32})(OR^{33})$ or $-NR^{34}R^{35}$,

in which

R^{31} represents hydrogen or has the meaning of R^9 given above and is identical to or different from it,

R^{32} and R^{33} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{34} and R^{35} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 6 carbon atoms which is optionally substituted by hydroxyl or by straight-chain or branched alkoxy having up to 4 carbon atoms, or

R^{34} and R^{35} together with the nitrogen atom form a 5- to 6-membered saturated heterocycle which may contain a further heteroatom from the group consisting of S and O, or a radical of the formula $-NR^{36}$,

in which

R^{36} represents hydrogen, hydroxyl, straight-chain or branched alkoxycarbonyl having up to 7 carbon atoms or straight-chain or branched alkyl having up to 5 carbon atoms which is optionally substituted by hydroxyl,

or

R^3 and R^4 together with the nitrogen atom form a 5- to 7-membered unsaturated or saturated or partially unsaturated, optionally benzo-fused heterocycle which may optionally contain up to 3 heteroatoms from the group consisting of S, N and O, or a radical of the formula $-NR^{37}$,

in which

R^{37} represents hydrogen, hydroxyl, formyl, trifluoromethyl, straight-chain or branched acyl, alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms,
or represents straight-chain or branched alkyl having up to 6 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, trifluoromethyl, carboxyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms, or by groups of the formula

$-(D)_f-NR^{38}R^{39}$, $-CO-(CH_2)_g-O-CO-R^{40}$, $-CO-(CH_2)_h-OR^{41}$ or $-P(O)(OR^{42})(OR^{43})$,

in which

g and h are identical or different and each represents a number 1, 2, 3 or 4,

and

f represents a number 0 or 1,

D represents a group of the formula -CO or $-SO_2$,

R^{38} and R^{39} are identical or different and each has the meaning of R^7 and R^8 given above,

R^{40} represents straight-chain or branched alkyl having up to 6 carbon atoms,

R^{41} represents straight-chain or branched alkyl having up to 6 carbon atoms,

R^{42} and R^{43} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

or

R^{37} represents a radical of the formula $-(CO)_i-E$,

in which

i represents a number 0 or 1,

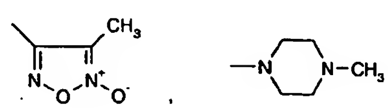
E represents cycloalkyl having 3 to 7 carbon atoms or benzyl, represents aryl having 6 to 10 carbon atoms or a 5- to 6-membered aromatic heterocycle having up to 4 heteroatoms from the group consisting of S, N and O, where the abovementioned ring systems are optionally mono- or polysubstituted by identical or different constituents selected from the group consisting of nitro, halogen, $-SO_3H$, straight-chain or branched alkoxy having up to 6 carbon atoms, hydroxyl, trifluoromethyl, trifluoromethoxy, or by a radical of the formula $-SO_2-NR^{44}R^{45}$,

in which

R^{44} and R^{45} have the meaning of R^{18} and R^{19} given above and are identical to or different from them,

or

E represents radicals of the formulae



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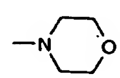
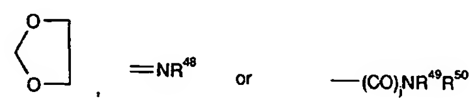


and the heterocycle listed under R^3 and R^4, which is formed together with the nitrogen atom, is optionally mono- or polysubstituted, if appropriate also geminally, by identical or different substituents selected from the group consisting of hydroxyl, formyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 6 carbon atoms, nitro and groups of the formulae $-P(O)(OR^{46})(OR^{47})$,



in which

R^{46} and R^{47} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{48} represents hydroxyl or straight-chain or branched alkoxy having up to 4 carbon atoms,

j represents a number 0 or 1,

and

R^{49} and R^{50} are identical or different and have the meanings of R^{14} and R^{15} given above,

and/or the heterocycle listed under R^3 and R^4, which is formed together with the nitrogen atom, is optionally substituted by straight-chain or branched alkyl having up to 6 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, halogen,

carboxyl, cycloalkyl or cycloalkyloxy having in each case 3 to 8 carbon atoms, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 6 carbon atoms, or by a radical of the formula $-SO_3H$, $-NR^{51}R^{52}$ or $P(O)OR^{53}OR^{54}$,

in which

R^{51} and R^{52} are identical or different and each represents hydrogen, phenyl, carboxyl, benzyl or straight-chain or branched alkyl or alkoxy having in each case up to 6 carbon atoms,

R^{53} and R^{54} are identical or different and have the meanings of R^{10} and R^{11} given above,

and/or the alkyl is optionally substituted by aryl having 6 to 10 carbon atoms which for its part may be mono- or polysubstituted by identical or different substituents selected from the group consisting of halogen, hydroxyl, straight-chain or branched alkoxy having up to 6 carbon atoms, or by a group of the formula $-NR^{51'}R^{52'}$,

in which

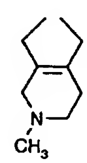
$R^{51'}$ and $R^{52'}$ have the meanings of R^{51} and R^{52} given above and are identical to or different from them,

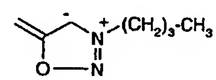
and/or the heterocycle listed under R^3 and R^4, which is formed together with the nitrogen atom, is optionally substituted by aryl having 6 to 10 carbon atoms or by a 5- to 7-membered saturated, partially unsaturated or unsaturated heterocycle having up to 3 heteroatoms from the group consisting of S, N and O, optionally also attached via a nitrogen function, where the ring systems for their part

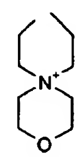
may be substituted by hydroxyl or by straight-chain or branched alkyl or alkoxy having in each case up to 6 carbon atoms,

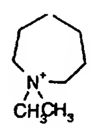
or

R^3 and R^4 together with the nitrogen atom form radicals of the formulae

,

,



or ,

R^5 and R^6 are identical or different and each represents hydrogen, straight-chain or branched alkyl having up to 6 carbon atoms, hydroxyl or represents straight-chain or branched alkoxy having up to 6 carbon atoms,

and their salts, hydrates, N-oxides and isomeric forms.

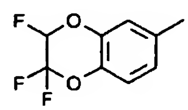
2. 2-Phenyl-substituted imidazotriazinones of the general formula (I) according to Claim 1 in which

R^1 represents straight-chain or branched alkyl having up to 3 carbon atoms,

R^2 represents straight-chain alkyl having up to 3 carbon atoms,

R^3 and R^4 are identical or different and each represents hydrogen or represents straight-chain or branched alkenyl or alkoxy having in each case up to 6 carbon atoms, or

represents a straight-chain or branched alkyl chain having up to 8 carbon atoms which is optionally interrupted by an oxygen atom and which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, carboxyl, benzyloxycarbonyl, straight-chain or branched alkoxycarbonyl having up to 5 carbon atoms, and by radicals of the formulae $-SO_3H$, $-(A)_a-NR^7R^8$, $-O-CO-NR^{7'}R^{8'}$, $-S(O)_b-R^9$, $-P(O)(OR^{10})(OR^{11})$,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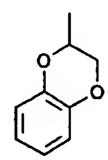
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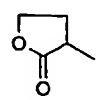
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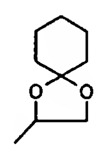


in which

a and b are identical or different and each represents a number 0 or 1,

A represents a radical CO or SO_2,

R^7, $R^{7'}$, R^8 and $R^{8'}$ are identical or different and each represents hydrogen, or cyclopropyl, cyclopentyl, cyclohexyl, cycloheptyl, phenyl, piperidinyl and pyridyl, where the abovementioned ring systems are optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, nitro, trifluoromethyl, trifluoromethoxy, carboxyl, fluorine, chlorine, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, or by a group of the formula $-(SO_2)_c-NR^{12}R^{13}$,

in which

c represents a number 0 or 1,

R^{12} and R^{13} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

or

R^7, $R^{7'}$, R^8 and $R^{8'}$ each represent straight-chain or branched alkoxy having up to 3 carbon atoms, or

represents straight-chain or branched alkyl having up to 7 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, phenyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, or by a group of the formula $-(CO)_d-NR^{14}R^{15}$,

in which

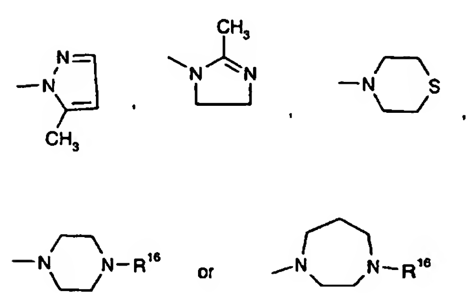
R^{14} and R^{15} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

and

d represents a number 0 or 1,

or

R^7 and R^8 and/or $R^{7'}$ and $R^{8'}$ together with the nitrogen atom form a pyrrolidinyl, morpholinyl, piperidinyl or triazolyl ring or radicals of the formulae



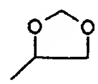
in which

R^{16} represents hydrogen, phenyl, benzyl, morpholinyl, pyrrolidinyl, piperidinyl, piperazinyl or N-methylpiperazinyl, or represents straight-chain or branched alkyl having up to 5 carbon atoms which is optionally substituted by hydroxyl,

R^9 represents straight-chain or branched alkyl having up to 3 carbon atoms,

R^{10} and R^{11} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

and/or the alkyl chain listed under R^3/R^4 is optionally substituted by cyclopropyl, cyclopentyl, cyclohexyl, cycloheptyl, phenyl, pyridyl, quinolyl, pyrrolidinyl, pyrimidyl, morpholinyl, furyl, piperidinyl, tetrahydrofuranyl or by radicals of the formulae



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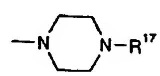


in which

R^{17} represents hydrogen, hydroxyl, formyl, trifluoromethyl, straight-chain or branched acyl or alkoxy having in each case up to 3 carbon atoms,
or represents straight-chain or branched alkyl having up to 4 carbon atoms which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl and straight-chain or branched alkoxy having up to 4 carbon atoms,

and where phenyl and the heterocycles are optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of nitro, fluorine, chlorine, $-SO_3H$, straight-chain or branched alkyl or alkoxy having in each case up to 4 carbon atoms, hydroxyl, and/or by a radical of the formula $-SO_2.NR^{18}R^{19}$,

in which

R^{18} and R^{19} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms,

and/or

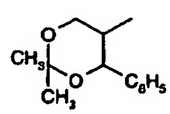
R^3 or R^4 represents a group of the formula $-NR^{20}R^{21}$,

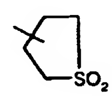
in which

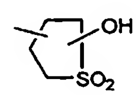
R^{20} and R^{21} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

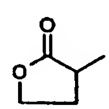
and/or

R^3 or R^4 represents adamantyl, or represents radicals of the formulae



, 



or 

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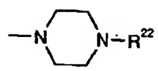
or represents cyclopentyl, cyclohexyl, cycloheptyl, phenyl, morpholinyl, oxazolyl, thiazolyl, quinolyl, isoxazolyl, pyridyl, tetrahydrofuranyl, tetrahydropyranyl or represents radicals of the formulae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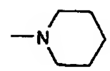
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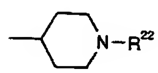
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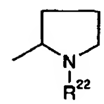

,

in which

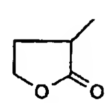
R^{22} has the meaning of R^{16} given above and is identical to or different from it, or
represents carboxyl, formyl or straight-chain or branched acyl having up to 3 carbon atoms,

and where cycloalkyl, phenyl and/or the heterocycles are optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of fluorine, chlorine, triazolyl, trifluoromethyl, trifluoromethoxy, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 5 carbon atoms, nitro and/or by groups of the formulae $-SO_3H$, $-OR^{23}$, $(SO_2)_eNR^{24}R^{25}$, $-P(O)(OR^{26})(OR^{27})$,

in which

e represents a number 0 or 1,

R^{23} represents a radical of the formula


, or

represents cyclopropyl, cyclopentyl, cyclobutyl, cyclohexyl or cycloheptyl,

represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms which may optionally be substituted by cyclopropyl, cyclopentyl, cyclohexyl, benzyloxy, tetrahydropyranyl, tetrahydrofuranyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, benzyloxycarbonyl or phenyl which for its part may be mono- or polysubstituted by identical or different substituents selected from the group consisting of straight-chain or branched alkoxy having up to 3 carbon atoms, hydroxyl, fluorine and chlorine,

and/or where alkyl is optionally substituted by radicals of the formulae $-CO-NR^{28}R^{29}$ or $-CO-R^{30}$,

in which

R^{28} and R^{29} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 5 carbon atoms, or

R^{28} and R^{29} together with the nitrogen atom form a morpholinyl, pyrrolidinyl or piperidinyl ring,

and

R^{30} represents phenyl or adamantyl,

R^{24} and R^{25} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

R^{26} and R^{27} have the meanings of R^{10} and R^{11} given above and are identical to or different from them

and/or cycloalkyl, phenyl and/or the heterocycles are optionally substituted by straight-chain or branched alkyl having up to 4 carbon atoms which is optionally substituted by hydroxyl, carboxyl, pyridyl, pyrimidyl, pyrrolidinyl, piperidinyl, tetrahydrofuranyl, triazolyl or by groups of the formula $-SO_2-R^{31}$, $-P(O)(OR^{32})(OR^{33})$ or $-NR^{34}R^{35}$,

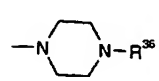
in which

R^{31} has the meaning of R^9 given above and is identical to or different from it,

R^{32} and R^{33} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{34} and R^{35} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 5 carbon atoms which is optionally substituted by hydroxyl or straight-chain or branched alkoxy having up to 3 carbon atoms, or

R^{34} and R^{35} together with the nitrogen atom form a morpholinyl, triazolyl or thiomorpholinyl ring or a radical of the formula

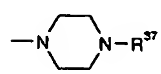


in which

R^{36} represents hydrogen, hydroxyl, straight-chain or branched alkoxycarbonyl having up to 5 carbon atoms or straight-chain or branched alkyl having up to 4 carbon atoms which is optionally substituted by hydroxyl,

or

R^3 and R^4 together with the nitrogen atom form a morpholinyl, thiomorpholinyl, pyrrolidinyl, piperidinyl ring, or a radical of the formula



in which

R^{37} represents hydrogen, hydroxyl, formyl, trifluoromethyl, straight-chain or branched acyl, alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms,
or represents straight-chain or branched alkyl having up to 5 carbon atoms which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, trifluoromethyl, carboxyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, or by groups of the formula $-(D)_f-NR^{38}R^{39}$, $-CO-(CH_2)_g-O-CO-R^{40}$, $-CO-(CH_2)_h-OR^{41}$ or $-P(O)(OR^{42})(OR^{43})$,

in which

g and h are identical or different and each represents a number 1, 2 or 3,

and

f represents a number 0 or 1,

D represents a group of the formula -CO or $-SO_2$,

R^{38} and R^{39} are identical or different and have the meanings of R^7 and R^8 given above,

R^{40} represents straight-chain or branched alkyl having up to 4 carbon atoms,

R^{41} represents straight-chain or branched alkyl having up to 4 carbon atoms,

R^{42} and R^{43} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

or

R^{37} represents a radical of the formula $-(CO)_i-E$,

in which

i represents a number 0 or 1,

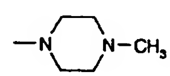
E represents cyclopentyl, cyclohexyl, cycloheptyl, benzyl, phenyl, pyridyl, pyrimidyl or furyl, where the abovementioned ring systems are optionally mono- or disubstituted by identical or different substituents selected from the group consisting of nitro, fluorine, chlorine, $-SO_3H$, straight-chain or branched alkoxy having up to 4 carbon atoms, hydroxyl, trifluoromethyl, trifluoromethoxy or by a radical of the formula $-SO_2-NR^{44}R^{45}$,

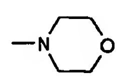
in which

R^{44} and R^{45} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

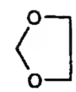
or

E represents radicals of the formulae



or  ,

and the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally mono- to trisubstituted, optionally also geminally, by identical or different substituents selected from the group consisting of hydroxyl, formyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 5 carbon atoms, nitro and groups of the formulae $-P(O)(OR^{46})(OR^{47})$,

, $=NR^{48}$ or $-(CO)_jNR^{49}R^{50}$

in which

R^{46} and R^{47} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{48} represents hydroxyl or straight-chain or branched alkoxy having up to 3 carbon atoms,

j represents a number 0 or 1,

and

R^{49} and R^{50} are identical or different and have the meanings of R^{14} and R^{15} given above,

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by straight-chain or branched alkyl having up to 5 carbon atoms which is optionally mono- or polysubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, carboxyl, cyclopropyl, cyclopentyl, cyclohexyl, cycloheptyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 4 carbon atoms, or by a radical of the formula $-SO_3H$, $-NR^{51}R^{52}$ or $-P(O)OR^{53}OR^{54}$,

in which

R^{51} and R^{52} are identical or different and each represents hydrogen, phenyl, carboxyl, benzyl or straight-chain or branched alkyl or alkoxy having in each case up to 4 carbon atoms,

R^{53} and R^{54} are identical or different and have the meanings of R^{10} and R^{11} given above,

and/or the alkyl is optionally substituted by phenyl which for its part may be mono- to trisubstituted by identical or different substituents selected from the group consisting of fluorine, chlorine, hydroxyl, straight-chain or branched alkoxy having up to 4 carbon atoms, or by a group of the formula $-NR^{51'}R^{52'}$,

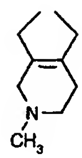
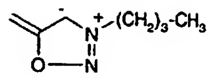
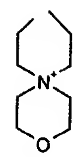
in which

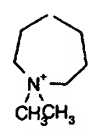
$R^{51'}$ and $R^{52'}$ have the meanings of R^{51} and R^{52} given above and are identical to or different from them,

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by phenyl, pyridyl, piperidinyl, pyrrolidinyl or tetrazolyl, optionally also attached via a nitrogen function, where the ring systems for their part may be substituted by hydroxyl or by straight-chain or branched alkyl or alkoxy having in each case up to 5 carbon atoms,

or

R^3 and R^4 together with the nitrogen atom form radicals of the formulae

,
,


or ,

R^5 and R^6 are identical or different and each represents hydrogen, hydroxyl or represents straight-chain or branched alkoxy having up to 4 carbon atoms,

and their salts, hydrates, N-oxides and isomeric forms.

3. 2-Phenyl-substituted imidazotriazinones of the general formula (I) according to Claim 1 in which

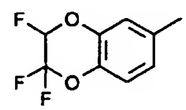
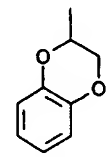
R^1 represents straight-chain or branched alkyl having up to 3 carbon atoms,

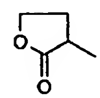
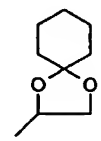
R^2 represents straight-chain alkyl having up to 3 carbon atoms,

R^3 and R^4 are identical or different and each represents hydrogen or represents straight-chain or branched alkenyl or alkoxy having in each case up to 4 carbon atoms, or

represents a straight-chain or branched alkyl chain having up to 6 carbon atoms which is optionally interrupted by an oxygen atom and

which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, carboxyl, straight-chain or branched alkoxycarbonyl having up to 4 carbon atoms, and/or by radicals of the formulae $-SO_3H$, $-(A)_a-NR^7R^8$, $-O-CO-NR^{7'}R^{8'}$, $-S(O)_b-R^9$, $-P(O)(OR^{10})(OR^{11})$,

 ,  ,

 and/or  .

in which

a and b are identical or different and each represents a number 0 or 1,

A represents a radical CO or SO_2,

R^7, $R^{7'}$, R^8 and $R^{8'}$ are identical or different and each represents hydrogen, or

represents cyclopentyl, cyclohexyl, cycloheptyl, phenyl, piperidinyl and pyridyl, where the abovementioned ring systems are optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, nitro, carboxyl, fluorine, chlorine, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by a group of the formula $-(SO_2)_c-NR^{12}R^{13}$,

in which

c represents a number 0 or 1,

R^{12} and R^{13} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

or

R^7, $R^{7'}$, R^8 and $R^{8'}$ each represent methoxy, or represent straight-chain or branched alkyl having up to 6 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, phenyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by a group of the formula $-(CO)_d-NR^{14}R^{15}$,

in which

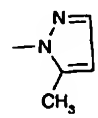
R^{14} and R^{15} are identical or different and each represents hydrogen, methyl or ethyl,

and

d represents a number 0 or 1,

or

R^7 and R^8 and/or $R^{7'}$ and $R^{8'}$ together with the nitrogen atom form a morpholinyl, piperidinyl or triazolyl ring or radicals of the formulae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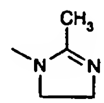
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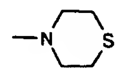
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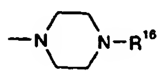
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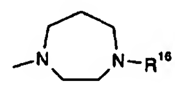


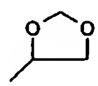
in which

R^{16} represents hydrogen, phenyl, benzyl, morpholinyl, pyrrolidinyl, piperidinyl, piperazinyl or N-methylpiperazinyl, or represents straight-chain or branched alkyl having up to 3 carbon atoms which is optionally substituted by hydroxyl,

R^9 represents methyl,

R^{10} and R^{11} are identical or different and each represents hydrogen, methyl or ethyl,

and/or the alkyl chain listed under R^3/R^4 is optionally substituted by cyclopropyl, cyclopentyl, cyclohexyl, cycloheptyl, morpholinyl, furyl, tetrahydrofuranyl, or by radicals of the formulae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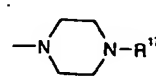


in which

R^{17} represents hydrogen, hydroxyl, formyl, acetyl or alkoxy having up to 3 carbon atoms,
or represents straight-chain or branched alkyl having up to 3 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl or straight-chain or branched alkoxy having up to 3 carbon atoms,

and where phenyl and the heterocycles are optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of fluorine, chlorine, $-SO_3H$, straight-chain or branched alkyl or alkoxy having in each case up to 3 carbon atoms, hydroxyl, and/or by a radical of the formula $-SO_2NR^{18}R^{19}$,

in which

R^{18} and R^{19} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms,

and/or

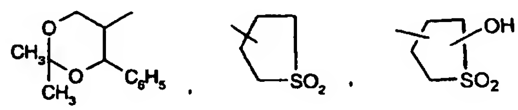
R^3 or R^4 represents a group of the formula $-NR^{20}R^{21}$,

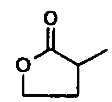
in which

R^{20} and R^{21} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

and/or

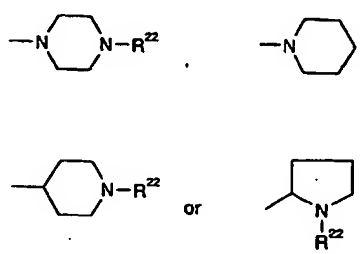
R^3 or R^4 represents adamantyl, or represents radicals of the formulae



or 

,

or represents cyclopentyl, cyclohexyl, cycloheptyl, phenyl, morpholinyl, oxazolyl, thiazolyl, quinolyl, isoxazolyl, pyridyl, tetrahydrofuranyl, tetrahydropyranyl, or represents radicals of the formulae



in which

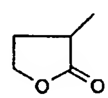
R^{22} has the meaning of R^{16} given above and is identical to or different from it, or
represents formyl or acetyl,

and where cycloalkyl, phenyl and/or the heterocycles are optionally mono- or disubstituted by identical or different substituents selected from the group consisting of fluorine, chlorine, triazolyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 4 carbon atoms, nitro, and/or by groups of the formulae $-SO_3H$, $-OR^{23}$, $(SO_2)_eNR^{24}R^{25}$, $-P(O)(OR^{26})(OR^{27})$,

in which

e represents a number 0 or 1,

R^{23} represents a radical of the formula



, or

represents cyclopropyl, cyclopentyl, cyclobutyl or cyclohexyl,
represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms which is optionally substituted by cyclopropyl, cyclohexyl, benzyloxy, tetrahydropyranyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, benzyloxycarbonyl or phenyl which for its part may be mono- or disubstituted by identical or different substituents selected from the group consisting of methoxy, hydroxyl, fluorine or chlorine,

and/or where alkyl is optionally substituted by radicals of the formulae $-CO-NR^{28}R^{29}$ or $-CO-R^{30}$,

in which

R^{28} and R^{29} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 4 carbon atoms, or

R^{28} and R^{29} together with the nitrogen atom form a morpholinyl, pyrrolidinyl or piperidinyl ring,

and

R^{30} represents phenyl or adamantyl,

R^{24} and R^{25} have the meaning of R^{18} and R^{19} given above and are identical to or different from them,

R^{26} and R^{27} have the meanings of R^{10} and R^{11} given above and are identical to or different from them

and/or cycloalkyl, phenyl and/or the heterocycles are optionally substituted by straight-chain or branched alkyl having up to 3 carbon atoms, which is optionally substituted by hydroxyl, carboxyl, pyridyl, pyrimidyl, pyrrolidinyl, piperidinyl, tetrahydrofuranyl, triazolyl or by groups of the formula $-SO_2-R^{31}$, $P(O)(OR^{32})(OR^{33})$ or $-NR^{34}R^{35}$,

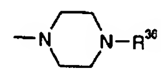
in which

R^{31} represents methyl,

R^{32} and R^{33} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{34} and R^{35} are identical or different and each represents hydrogen or straight-chain or branched alkyl having up to 3 carbon atoms which is optionally substituted by hydroxyl or methoxy, or

R^{34} and R^{35} together with the nitrogen atom form a morpholinyl, triazolyl or thiomorpholinyl ring or a radical of the formula

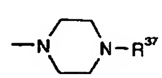

,

in which

R^{36} represents hydrogen, hydroxyl, straight-chain or branched alkoxycarbonyl having up to 3 carbon atoms or straight-chain or branched alkyl having up to 3 carbon atoms which is optionally substituted by hydroxyl,

or

R^3 and R^4 together with the nitrogen atom form a morpholinyl, thiomorpholinyl, pyrrolidinyl, piperidinyl ring, or a radical of the formula


,

in which

R^{37} represents hydrogen, hydroxyl, formyl, straight-chain or branched acyl, alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms,

or represents straight-chain or branched alkyl having up to 4 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by groups of the formula $-(D)_f-NR^{38}R^{39}$, $-CO-(CH_2)_g-O-CO-R^{40}$, $-CO-(CH_2)_h-OR^{41}$ or $-P(O)(OR^{42})(OR^{43})$,

in which

g and h are identical or different and each represents a number 1 or 2,

and

f represents a number 0 or 1,

D represents a group of the formula -CO or $-SO_2$,

R^{38} and R^{39} are identical or different and have the meanings of R^7 and R^8 given above,

R^{40} represents straight-chain or branched alkyl having up to 3 carbon atoms,

R^{41} represents straight-chain or branched alkyl having up to 3 carbon atoms,

R^{42} and R^{43} are identical or different and each represents hydrogen, methyl or ethyl,

or

R^{37} represents a radical of the formula $-(CO)_i-E$,

in which

i represents a number 0 or 1,

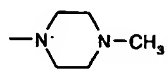
E represents cyclopentyl, benzyl, phenyl, pyridyl, pyrimidyl or furyl, where the abovementioned ring systems are optionally mono- or disubstituted by identical or different substituents selected from the group consisting of nitro, fluorine, chlorine, $-SO_3H$, straight-chain or branched alkoxy having up to 3 carbon atoms, hydroxyl, or by a radical of the formula $-SO_2-NR^{44}R^{45}$,

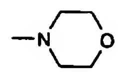
in which

R^{44} and R^{45} have the meanings of R^{18} and R^{19} given above and are identical to or different from them,

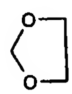
or

E represents radicals of the formulae



or  ,

and the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally mono- to trisubstituted, optionally also geminally, by identical or different substituents selected from the group consisting of hydroxyl, formyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 3 carbon atoms, or groups of the formulae $-P(O)(OR^{46})(OR^{47})$,

 , $=NR^{48}$ or $-(CO)_jNR^{49}R^{50}$

in which

R^{46} and R^{47} have the meanings of R^{10} and R^{11} given above and are identical to or different from them,

R^{48} represents hydroxyl or methoxy,

j represents a number 0 or 1,

and

R^{49} and R^{50} are identical or different and have the meanings of R^{14} and R^{15} given above,

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by straight-chain or branched alkyl having up to 4 carbon atoms which is optionally mono- to trisubstituted by identical or different substituents selected from the group consisting of hydroxyl, fluorine, chlorine, carboxyl, cyclopropyl, cycloheptyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by a radical of the formula $-SO_3H$, $-NR^{51}R^{52}$ or $P(O)OR^{53}OR^{54}$,

in which

R^{51} and R^{52} are identical or different and each represents hydrogen, phenyl, carboxyl, benzyl or straight-chain or branched alkyl or alkoxy having in each case up to 3 carbon atoms,

R^{53} and R^{54} are identical or different and have the meanings of R^{10} and R^{11} given above,

and/or the alkyl is optionally substituted by phenyl which for its part may be mono- to disubstituted by identical or different substituents selected from the group consisting of fluorine, chlorine, hydroxyl, methoxy, or by a group of the formula $-NR^{51'}R^{52'}$,

in which

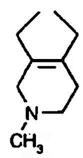
$R^{51'}$ and $R^{52'}$ have the meanings of R^{51} and R^{52} given above and are identical to or different from them,

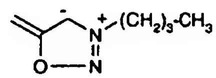
and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by phenyl,

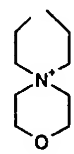
pyridyl, piperidinyl, pyrrolidinyl or tetrazolyl, if appropriate also attached via a nitrogen function, where the ring systems for their part may be substituted by hydroxyl or by straight-chain or branched alkyl or alkoxy having in each case up to 3 carbon atoms,

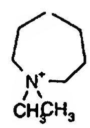
or

R^3 and R^4 together with the nitrogen atom form radicals of the formulae

 ,

 ,



or  ,

R^5 and R^6 are identical or different and each represents hydrogen, hydroxyl or represents straight-chain or branched alkoxy having up to 3 carbon atoms,

and their salts, hydrates, N-oxides and isomeric forms.

4. 2-Phenyl-substituted imidazotriazinones of the general formula (I) according to Claim 1 in which

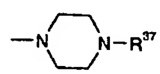
R^1 represents methyl or ethyl,

R^2 represents ethyl or propyl,

R^3 and R^4 are identical or different and each represents a straight-chain or branched alkyl chain having up to 5 carbon atoms which is optionally substituted up to two times by identical or different substituents selected from the group consisting of hydroxyl and methoxy,

or

R^3 and R^4 together with the nitrogen atom form a piperidinyl, morpholinyl, thiomorpholinyl ring, or a radical of the formula



in which

R^{37} represents hydrogen, formyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 3 carbon atoms,
or represents straight-chain or branched alkyl having up to 3 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, carboxyl, straight-chain or branched alkoxy or alkoxycarbonyl having in each case up to 3 carbon atoms, or by groups of the formulae $-(D)_f-NR^{38}R^{39}$ or $-P(O)(OR^{42})(OR^{43})$,

in which

f represents a number 0 or 1,

D represents a group of the formula -CO,

R^{38} and R^{39} are identical or different and each represents hydrogen or methyl,

R^{42} and R^{43} are identical or different and each represents hydrogen, methyl or ethyl,

or

R^{37} represents cyclopentyl,

and the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally mono- or disubstituted, optionally also geminally, by identical or different substituents selected from the group consisting of hydroxyl, formyl, carboxyl, straight-chain or branched acyl or alkoxycarbonyl having in each case up to 3 carbon atoms, or groups of the formulae -P(O)(OR^{46})(OR^{47}) or -$(CO)_j NR^{49}R^{50}$,

in which

R^{46} and R^{47} are identical or different and each represents hydrogen, methyl or ethyl,

j represents a number 0 or 1,

and

R^{49} and R^{50} are identical or different and each represents hydrogen or methyl

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by straight-chain or branched alkyl having up to 3 carbon atoms which is optionally mono- or disubstituted by identical or different substituents selected from the group consisting of hydroxyl, carboxyl, or by a radical of the formula $P(O)OR^{53}OR^{54}$,

in which

R^{53} and R^{54} are identical or different and each represents hydrogen, methyl or ethyl,

and/or the heterocycles listed under R^3 and R^4, which are formed together with the nitrogen atom, are optionally substituted by pyrrolidinyl or piperidinyl attached via nitrogen,

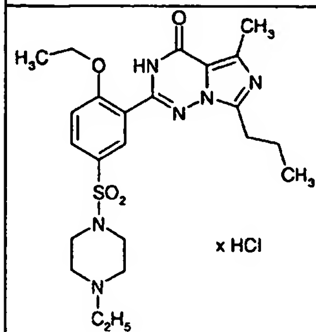
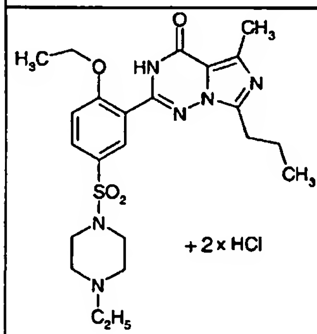
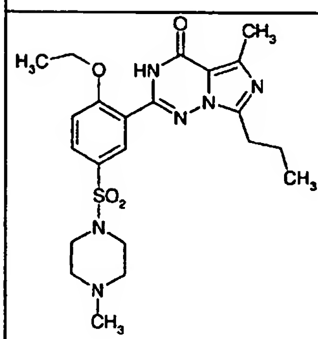
R^5 represents hydrogen,

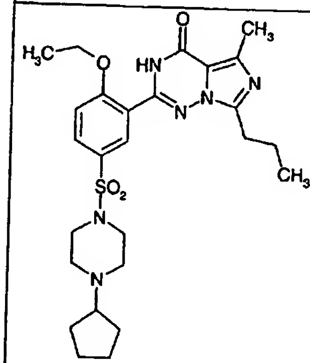
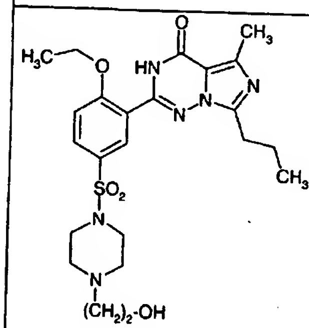
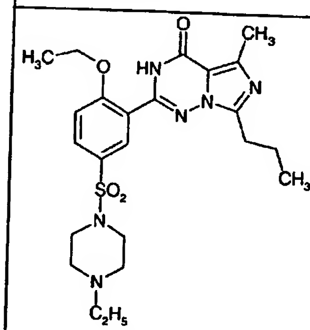
and

R^6 represents ethoxy or propoxy,

and their salts, hydrates, N-oxides and isomeric forms.

5. 2-Phenyl-substituted imidazotriazinones according to Claims 1 to 4 having the following structures:

Structure
 x HCl
 + 2 x HCl


Structure




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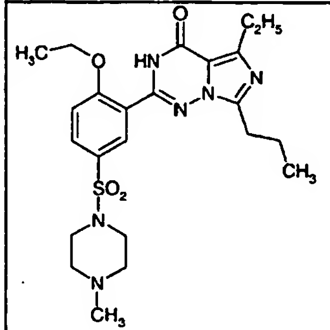
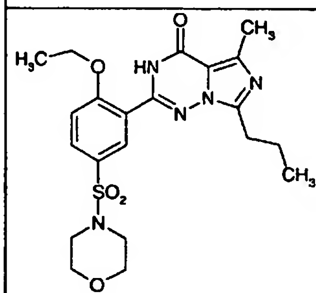
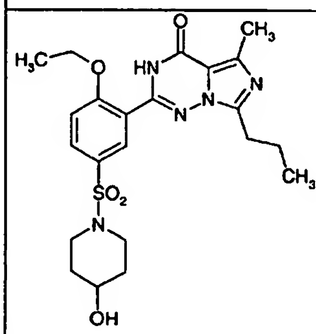
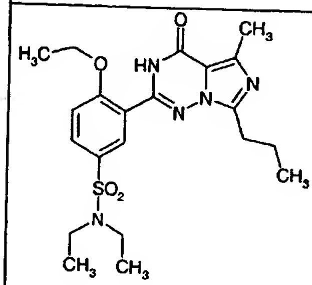
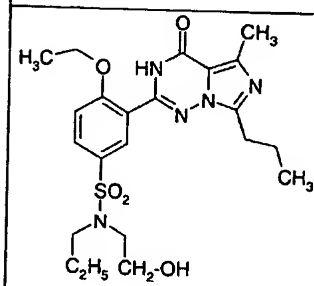
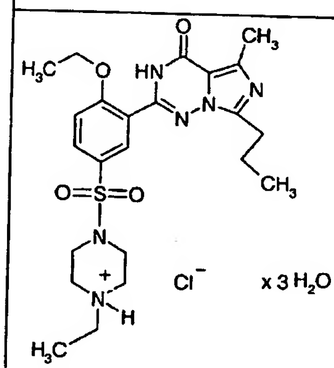
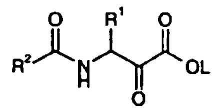




Structure




6. 2-Phenyl-substituted imidazotriazinones of the general formula (I) according to Claim 1 for the treatment of disorders.

7. Process for preparing 2-phenyl-substituted imidazotriazinones according to Claim 1, characterized in that

initially compounds of the general formula (II)



(II)

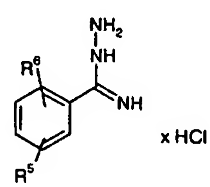
in which

R^1 and R^2 are each as defined above

and

L represents straight-chain or branched alkyl having up to 4 carbon atoms,

are converted with compounds of the general formula (III)

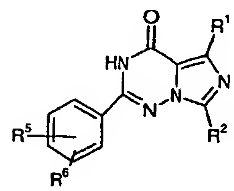


(III)

in which

R^5 and R^6 are each as defined above,

in a two-step reaction in the systems ethanol and phosphorus oxytrichloride/ dichloroethane into the compounds of the general formula (IV)

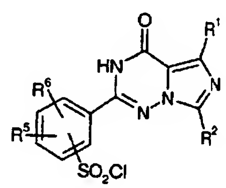


(IV)

in which

R^1, R^2, R^5 and R^6 are each as defined above,

which are reacted in a further step with chlorosulphonic acid to give the compounds of the general formula (V)



(V)

in which

R^1, R^2, R^5 and R^6 are each as defined above,

which are finally reacted with amines of the general formula (VI)

$$HN^3R^4 \qquad \text{(VI)}$$

in which

R^3 and R^4 are each as defined above,

in inert solvents.

8. Pharmaceuticals which comprise at least one 2-phenyl-substituted imidazotriazinone according to Claim 1 and pharmacologically acceptable formulating agents.

9. Pharmaceuticals according to Claim 8 for the treatment of cardiovascular, cerebrovascular disorders and/or disorders of the urogenital tract.

10. Pharmaceuticals according to Claim 9 for the treatment of erectile dysfunction.

11. The use of 2-phenyl-substituted imidazotriazinones according to Claim 1 for preparing pharmaceuticals.

12. 2-Phenyl-substituted imidazotriazinones of the general formula I, pharmaceutical preparations containing same, methods for their preparation and/or uses thereof substantially as herein described with reference to the Examples.

DATED this 27th day of July 2001

BAYER AKTIENGESELLSCHAFT
By its Patent Attorneys
DAVIES COLLISON CAVE